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No. XXV. OF Vol. I., 1930.
No. 5573 **Vol. CCXVIII.**

LONDON, SATURDAY, JUNE 21, 1930.
Founded 1823. Registered as a Newspaper. Published Weekly.

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Observations ON DIVERTICULITIS.*

BY E. G. SLESINGER, O.B.E., M.S., F.R.C.S.,
ASSISTANT SURGEON TO GUY'S HOSPITAL.

DIVERTICULA of the colon were first described by Cruveilhier in 1849, and the first description in English was by Habershon, physician to Guy's Hospital in 1857, who published an excellent account of the condition as seen in post-mortem material. Guy's has a particular interest in this subject, for the first illustration of diverticula of the colon appeared in a paper by Arbuthnot Lane, published in *Guy's Hospital Reports* in 1885. In spite of these early and excellent accounts, however, it was not until some twenty years ago that the pathological and clinical importance of the condition came to be recognised, and it is only since the technique of radiographic examination of the colon has been perfected that the early stages have become known and its clinical features and appropriate treatment have been worked out.

Diverticula of the colon are very much commoner than is generally realised, and the figures from the Mayo Clinic show that they are to be found in roughly one person in every eight over the age of 45. Their commonest site is in the sigmoid, and in about 40 per cent. of cases they are confined to this region of the bowel. In a further 30 per cent. of the cases diverticula are found scattered throughout the colon, including, of course, the sigmoid, and in the remaining cases they are situated in the splenic flexure, transverse colon, cæcum, or rectum. The ascending colon is almost never involved. The important point to remember, however, is that the sigmoid is affected either alone or in association with other parts in over 70 per cent. of cases; it is primarily as a disease of the sigmoid that we shall consider the matter to-day.

F. de Quervain and E. I. Spriggs independently have suggested that the term diverticulosis should be used to describe the mere presence of diverticula and that diverticulitis should be reserved for the cases with those additional inflammatory changes which are responsible for all the severe symptoms and complications which may ensue. The diverticula vary in size from almost microscopic dimensions to from 2 to 4 cm. in diameter, but they very seldom exceed that size. They occur in a part of the intestine which is usually loaded with fat, and frequently tend to grow into the appendices epiploicæ, with the result that in situ they are difficult to distinguish, and all that is visible is a tuberous appearance of the bowel. When, however, the fat is stripped off, the diverticula are seen as typically bluish-black flask-shaped outpouchings set roughly in two parallel rows. The blue-black colour is due to the fact that the mucosa and submucosa have herniated through the muscular wall and the colour of the fæcal contents is seen through the thin wall. Usually a whitish strip or collar can be made out round the neck of the diverticulum which marks the limit of the muscular covering. The points in the circumference of the bowel at which the diverticula appear vary somewhat, but the commonest site is between the mesocolic and the antimesenteric longitudinal muscle bands, and as that is where the vessels pierce the muscular wall it seems probable that this point of entry of the vessels forms a weak point in the circular muscle layer.

The diverticula are usually full of fæcal material and enlarge as more bowel content is forced into them, and as they do so they very often force their way into the appendices epiploicæ.

* Based on a lecture delivered at Guy's Hospital.

ORIGIN OF THE DIVERTICULA.

From the ætiological point of view the first point to consider is whether these diverticula are congenital or acquired. While occasional congenital diverticula do undoubtedly occur, there can be no doubt that the majority are acquired, as is proved by the fact that they almost invariably occur in middle and later life, while their development has often been watched for several years by X ray examination; 85 per cent. of a series of 100 cases examined by R. Mailer occurred between the ages of 40–70, and the condition is about twice as frequent in men as in women.

Spriggs and O. A. Marxer, as the result of careful radiological study, describe what they term a prediverticular state in which there is irritation and inflammation of the whole circumference of the bowel, and they believe that the herniæ occur owing to damage to the muscle-fibres during this stage. There can be no doubt that diverticulosis is almost always associated with septic foci elsewhere—such as septic teeth, arthritis of the spine, or cholecystitis—which would provide a focus for infection. Other views of the cause of these herniæ are that they are the result of the increased pressure resulting from constipation on a weak and degenerating musculature, or that they are due to weakness at the point of entry of the blood-vessels. R. Davies-Colley holds that they are the result of a muscle degeneration due to the pressure of an abnormal amount of fat round the colon, but Spriggs has shown that these patients are no fatter on the average than normal control patients, and many cases of diverticulosis have been found in thin and wasted individuals.

ORIGIN OF SYMPTOMS.

It is doubtful whether the presence of diverticula by themselves gives rise to any symptoms at all, except possibly those due to the hypothetical sigmoiditis which Spriggs suggests is responsible for their formation. The symptoms that do arise are due either to mechanical or to inflammatory changes in them.

The mechanical changes are the lodgment in the diverticula of fæcal concretions. These gradually increase in size as more material is forced into the pouch from the constipated colon, and cases of so-called "pistol shot" perforation have been described by Murray where there is no inflammatory ulceration but where the concretion is forced through the thin-walled sac by the peristalsis of the bowel.

The inflammatory changes are, however, by far the commonest and most important, and may be either acute or chronic, while very frequently the case comes under notice because of an acute exacerbation of a chronic infection. In acute infections, which are very rare, the changes in the diverticulum are similar to those seen in acute appendicitis, and gangrene and perforation may ensue in a few hours, leading to generalised peritonitis.

Last year, in consultation with Dr. D. M. MacManus, I saw a woman of 65 who was quite well until 10 o'clock one morning, when she began to have severe pain in the left iliac fossa. This continued until noon when she had a collapse marked by sweating, fainting, coldness of the extremities, and a very feeble pulse. She rallied from this collapse, and when I saw her at 4 P.M. she had marked rigidity and tenderness of the lower abdomen on both sides, with pain more in the middle than it had been. I operated on her and found her peritoneum full of pus, and she had diverticulitis of the sigmoid with a perforation of one of the diverticula which was gangrenous at its tip. I closed this and covered it with fat, and instituted slow irrigation of the peritoneal cavity by means of Carrel tubes with saline, and she made a good recovery.

The commoner change is one of chronic inflammation which is associated with much thickening and rigidity of the bowel. The fat of the colon becomes coarse and granular, the mesentery is thickened and shortened, and the area of colon affected becomes hard and rigid and is very frequently mistaken for a growth on abdominal exploration. It is in the highest degree probable that the patients one sees

sometimes surviving for long periods after colostomy performed for growth of the sigmoid were really suffering from diverticulitis and not growth; for it is often impossible to tell the difference from the outside, and it is often difficult to do so even when the bowel has been opened.

As the result of this chronic inflammation there may be very various secondary pathological results, of which the commonest are peritonitis of varying grades—either generalised peritonitis, pelvic peritonitis, abscess formation, or the formation of adhesions to the bladder or small intestines or side wall of the pelvis where the adhesions not infrequently involve the iliac vessels and the ureter. Later still perforation of a diverticulum may give rise to fistulæ of various types, of which the commonest is between the bowel and the bladder, though cases occur of fistulæ communicating with other hollow viscera.

Diverticulitis is by far the commonest cause of vesico-colic fistula—a far commoner cause of this condition than is cancer. Such a fistula may be in the nature of a direct communication between a diverticulum and the bladder, or may take place by way of an abscess cavity formed between the bladder and the inflamed colon. It is an interesting fact that the presence of a hard tumour in the bowel, accompanied by the passage of gas and fæces per urethram, is in the great majority of cases due to diverticulitis, yet when one sees these cases the tendency to make a diagnosis of cancer is very strong indeed. Although this fact is well recognised by all those who have studied this condition, there are still many patients who are denied the opportunity of surgical relief owing to the diagnosis of cancer being made, so that I want to lay stress on this point.

Clinical Varieties.

When we come to consider the clinical features of diverticulitis we find a variety of picture depending on the stage of the disease with which we are dealing. As in so many other diseases, a good deal of confusion arises from the fact that the first cases to be described were late cases, cases with complications, and that for a long time the clinical picture was based entirely on these late cases. Symptomatology is probably the department of surgery which needs a complete overhaul more than any other. It needs an overhaul which will disentangle the symptoms of the disease from those of its results, and which will enable us to diagnose conditions capable of repair without having to wait for resulting destructive lesions to give us the so-called typical symptomatology. Cholecystitis and duodenal ulcer are two of the conditions which have been successfully rescued from this muddle of symptomatology, so that we can now diagnose them successfully without waiting for their complications, and consequently treatment, both medical and surgical, can be carried out with reasonable hopes of success because irreparable damage has not yet been done. To return to the question of diverticulitis, it should be and is possible to diagnose this condition in the early stages, and when that is done treatment is usually very successful. In any patient over the age of 40 who complains of discomfort in the lower part of the abdomen, and especially in the left iliac fossa, associated with constipation, irritability of the bladder, and occasional attacks of slight pyrexia, diverticulitis must be thought of as a probable diagnosis. In such a case there is nearly always tenderness in the left iliac fossa or over the pubis, and there may be thickening of the iliac colon or a definite tumour in this region. Examination by a competent radiologist will confirm the diagnosis.

In the later cases a variety of symptoms are present, and they can be grouped roughly into three types, according to the locality and extent of the inflammatory spread—namely, the inflammatory type, the obstructive type, and the genito-urinary type. In the first group acute *inflammatory* attacks may occur which are very similar to those of appendicitis, but situated on the left side. These attacks may begin quite suddenly with acute pain after a heavy meal, when straining at stool, after an aperient, or during the administration of an enema, and in other cases the attacks have begun while at work or at play. Their severity varies as much as it does in appendicitis, from the severe case with a rapid generalising peritonitis such as the woman I mentioned, to milder types with abscess formation or merely resulting in the formation of adhesions. The local signs are similar to those in appendicitis, but on the opposite side, and patients often describe the pain as radiating into one or both testicles or to the vagina in women. If the rigidity is not great an elongated tender tumour may be felt in the region of the iliac or sigmoid colon, and this tumour can often be felt better on bimanual examination than from the abdomen alone.

If the tumour is present it is often found to diminish greatly or even to disappear after the attack, to reappear again in the next one. The *obstructive* type is the one most often mistaken for a carcinoma, and often the history and symptoms are strikingly similar. There is usually a life-long history of constipation, and this is found gradually to increase until the patient is completely obstructed. Associated with the obstruction there is a good deal of pain and tenderness in the left iliac fossa and often considerable pyrexia, which is, of course, unusual in carcinoma. There is seldom blood or mucus in the stool, even occult blood being usually absent. Patients often notice that their pain is better when their bladder is empty, and worse when it is full. A moderate polymorphonuclear leucocytosis is common and further helps to distinguish the condition from carcinoma.

In the third or *genito-urinary* group the main symptoms are referred to the bladder. In all types of diverticulitis frequency of micturition and a burning pain at the beginning or end of the act is common, but in the type of case I am speaking of now more acute symptoms are present. There is often a history of increasing constipation and intermittent pain in the left iliac fossa or the perineum for a week or so before the attack. Then there is a sudden attack of urgent burning and painful micturition, accompanied by the passage of small grape-seed-like fæcal particles from the urethra and of audible gas at the end of micturition. The urine is heavy with sediment and has a fæcal odour. The passage of gas relieves the severe pain, but frequency and urgency persist, accompanied by cystitis of varying degree until operative relief is given. In such a case cystoscopy will demonstrate the fistula usually situated on the lateral wall of the bladder.

Diagnostic Methods.

In the diagnosis of diverticulitis, cases with acute complications, such as a general peritonitis, peritoneal abscess, or vesico-colic fistula will, of course, be recognised from the symptoms of the complication, and diverticulitis will be remembered as one of the causes of these complications. Whenever any inflammation has occurred round the diverticula, however, there will be pain and discomfort with associated tenderness, and often the inflamed area can be palpated through the abdominal wall. Irregular pyrexia, moderate leucocytosis, absence of blood from the stools, and irritability of the bladder help to confirm the diagnosis.

Patients with diverticulitis are usually but not always well covered with fat, and generally give a life-long history of constipation.

Sigmoidoscopic examination is useful in putting out the possibility of a carcinoma of the recto-sigmoid with fæcal retention above it, but usually in diverticulitis the area affected is beyond reach. Nevertheless cases have occasionally been recorded where the mouths of the diverticula have been seen to open through the sigmoidoscope on inflation.

X rays, however, afford the only means of diagnosing the presence of diverticula with certainty. Both an opaque meal and an enema should be used, as though it is the latter which will usually demonstrate the diverticula, the former will give most help in esti-

mating the degree of their effect on the functions of the bowel. Usually typical rounded oval or crescentic shadows of the barium in the diverticula will be recognised, and often are best seen after the barium enema has been evacuated, when two rows of small rounded shadows with narrow necks connecting them with the bowel can be seen. They may be visible for several days after the enema has been given. Marxer has pointed out, however, that these shadows are not the characteristic features. These are the spike or palisade-like projections of barium shadows from the lumen of the bowel, the wall of which is thickened and fixed. A series of films taken at short intervals, when superimposed, shows no variation in the outline of these shadows, although there may be vigorous and irritable contractions of the bowel wall above and below. This method of examination of superimposed serial films is of great value in estimating the degree of diverticulitis as opposed to diverticulosis which is present.

There are two fallacies to be remembered in regard to X ray examination in these cases. One is that the degree of obstruction shown after a barium enema is often a considerable exaggeration of the true state of affairs, since a good deal of spasm is induced in these irritable colons by the stimulus of the enema. The other is that in the cases with much thickening from inflammation, the diverticula may not show in the radiogram at all, in which case reliance must be placed on the demonstration of an area of rigidity and on the irregular palisading of the contents of the colon.

There is considerable diversity of opinion as to the frequency with which carcinoma develops in a colon the subject of diverticulitis, if indeed it does so at all. W. J. Mayo reported the presence of carcinoma in 13 out of 42 cases, but Judd and Pollock, from an examination of specimens, believe that a patient with diverticulitis is no more liable to develop carcinoma than a normal patient, and that is the view I am inclined to agree with. The clinical distinction between carcinoma and diverticulitis may, as I have said, be very difficult; many cases have been operated on and the specimen removed under the impression that it was a carcinoma, and the mistake has not become apparent until microscopic sections were examined. Tenesmus and painful defæcation are commoner in carcinoma, as is the passage of blood in the motions. Mucus may be passed in both conditions, but it is commoner in carcinoma. Pain is present in both diseases, but in carcinoma usually radiates through to the back which it very seldom does in diverticulitis. Pyrexia and leucocytosis are usual in diverticulitis and rare in carcinoma, and, as I have said, the presence of a vesico-colic fistula is very much more in favour of diverticulitis than of growth.

TREATMENT.

In regard to treatment we must consider the prophylactic, the medical, and the surgical treatment. As to prophylaxis, if diverticula are discovered accidentally during a routine radiographic examination of the colon, their significance must be explained to the patient and treatment must be directed to preventing the stagnation of hard fæces in them. Sufficient paraffin must be given to keep the motions soft, and a diet should be chosen which leaves the minimum of solid undigested residue. Salads, green vegetables, pips and skins of fruit, currants, raisins, &c., must be prohibited, and articles of diet which stimulate peristalsis chemically should be eaten freely. When actual diverticulitis is present, if the attack is a mild one and complications such as peritonitis are absent, medical treatment should be tried. This will consist in complete rest in bed until pain, tenderness, rigidity, and pyrexia have disappeared and the diet just mentioned should be instituted. Paraffin (8 to 10 oz.) should be slowly run into the bowel under low pressure every evening, and if possible be retained overnight, and should be slowly washed out with saline in the morning. Atropine must be given, either alone or with hyoscyamus, either by mouth or hypodermically, to counteract spasm, and purgatives should be avoided. As soon as the attack begins to abate, paraffin by mouth should be given, and the rectal paraffin may be reduced in amount and frequency. By these means attacks will be found to subside in many cases, and even if surgery is called for in the treatment of some complication this type of medical treatment will often avoid a recurrence or the necessity of the severe procedure of resection.

In regard to surgical treatment, the first point I would like to impress on you is that any attempt at radical removal of the area of bowel affected should never be undertaken in the presence of peritoneal infection. Such a procedure is almost certain to kill the patient. In the cases with general peritonitis the treatment must, in the first place, be directed to that alone, and drainage with Carrel tube irrigation in my view holds out the best chance of recovery. In the less acute cases with abscess formation, the abscess should be drained and a colostomy or cæcostomy performed. After a colostomy the inflammatory mass will often subside with surprising rapidity, and the colostomy may be closed, or resection of the affected area of bowel may be undertaken later. It is in the obstructive type of case, with tumour formation and gradually increasing stenosis, that resection is most often called for, and these cases are difficult and call for very careful surgical judgment if a disaster is to be avoided. In occasional cases a primary resection of the area affected with end-to-end union is possible, and should usually be done over a tube, but the temptation to perform this attractive method of relieving the patient often has to be resisted on account of the dangers of leakage from a junction performed low in the pelvis and often between inflamed segment of bowel. The safest way to resect these cases where possible is the three-stage method of Mickulicz. In this operation the first stage consists in bringing the diseased segment of bowel outside the abdomen and fixing it there over a glass rod. This is sometimes not so easy as it sounds, owing to shortness of the mesentery, but careful separation on the outer side of the mesentery will often make it possible. In a few days the affected bowel is cut off with a diathermy knife, and the third stage consists of restoring the continuity of the bowel either by one of the crushing methods or by suture. While this method is naturally unpleasant for the patient in that it entails two or three operations, it is far the safest, and an unpleasant procedure with a live patient at the end is better than the neatest of operations resulting in a dead one.

The most difficult cases of all to treat surgically are those with a vesico-colic fistula. As a rule a preliminary colostomy is required with spur formation so that no contents pass below the opening. The lower bowel can then be got reasonably clean, and the severity of the cystitis diminished before further operation is undertaken. If the colostomy can be performed just above the area of diverticulitis, it is sometimes of advantage, as the opening can then be resected with the affected area of bowel. At the second operation the bowel is separated from the bladder, and the opening into this organ is pared and inverted. The colon must be treated according to circumstances. Very occasionally the actual perforated diverticulum can be inverted into the bowel, but usually the condition is too advanced for that, and the affected bowel must be resected. If this is a moderately local area and situated not too low down, end-to-end union over a tube may be possible, but in many cases the lower end of the bowel will have to be closed and the patient will have to pay the price of a permanent colostomy for relief from his symptoms.

Such, then, is briefly the treatment we have to offer; and it is evident that much can be done for these patients provided a reasonably early diagnosis is made. Both medical and surgical treatment have

their part to play—a state of affairs which is common to many abdominal and other diseases. We hear far too much about people "believing" in either medical or surgical treatment for any particular condition. The truth is that the good physician will use surgery as freely as any of the other curative methods at his disposal, and the good surgeon, who should be a physician at heart, will not allow pride of craft to influence his judgment.

THE ACTIVATION OF SYPHILIS BY TREATMENT.

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THE object of this communication is to bring together facts which appear to demonstrate conclusively that not only may inadequate treatment by 914 and its allies produce an arsenic-resistant type of spironema, but that treatment, especially insufficient treatment, may actually activate latent syphilis.

It is now 20 years since Ehrlich and Hata announced the discovery of salvarsan. During the optimistic period which inevitably follows the introduction of an intensely advertised addition to the therapeutic armamentarium, a ritual of treatment was evolved and was widely followed. If we may judge from the opinions expressed by leading syphilologists in recent discussions and communications to the medical press, stereotyped routine has given place to a plasticity which indicates a tardy appreciation of accumulated experience It is hardly an exaggeration to say that after 20 years' trial of the modern remedies there is an absence of unanimity as to the best method of treating syphilis. The introduction of bismuth into antisyphilitic therapy by Levaditi and Sazerac in 1920 introduced a new and important factor, and those of us who were brought up in the old tradition are gratified to see that the claims of mercury are again receiving recognition.

Watrin, in an article on arseno-resistance, justly remarks that "whatever be the cause arsenical treatment is not so simple as it appeared to be some years ago."[1] Now, so long ago as 1911, only a year after the debut of salvarsan, McIntosh and Fildes warned us of the possible production of strains of spirochætes "fast to 606," and stated very definitely that "if such strains become general, the therapeutic value of the substance will be much diminished." They pointed out that the survivors of sublethal doses acquire an immunity, and that "in practice . . . . . such strains, if they occur, will be produced by an initial treatment of too slight intensity."[2] The warning of these writers has been amply justified. The conditions they foreshadowed have been completely fulfilled. For a long period it has been the custom to treat syphilis by small doses of the arsenicals repeatedly administered by intravenous injection in one or more courses. The very natural reluctance to give Ehrlich's effective doses to ambulant patients, who are under no control and may not be seen for a week, is an important factor not only in increasing the resistance of the spironema, but in actually stimulating it to activity, as I propose to show shortly.

An examination of recent pronouncements shows that there are extraordinary variations as to what are now deemed to be safe doses of the arsenicals. We also observe that while one authority advises *alternate* courses of 914 and bismuth, another insists on the imperative necessity of the *simultaneous* administration of these remedies, a third recommends an initial course of mercury, followed by arsenicals, then by bismuth, concluding with iodides. Another school would, even in early syphilis, always add pyrotherapy (malarial treatment, &c.), to chemotherapy. This last contention makes it seem possible that, as I have suggested elsewhere, our early dramatic successes with 606 may have been partly due to the pyrexia with rigors caused by our giving the drug in 100 c.cm. of imperfectly sterilised normal saline.

Some of the differences of opinion may perhaps be explained by the impossibility of keeping accurate observation on large numbers of persons treated as out-patients. It is, however, obvious that our 20 years' experience of salvarsan therapy has resulted in agreement upon one point—that it is impossible to rely upon arsenicals alone to effect a cure, if we can still speak of a "cure" of syphilis. No one will, I think, contest the opinion of Warthin[3] that the chief advantage of the arsenobenzols is "the more rapid reduction of the average case to a stage of latency." "This latency," he points out, "may last throughout the individual's life, or at any time exacerbations may take place and the disease arise above the clinical horizon." As a pathologist he remarks upon our ignorance as to whether these renewals of virulence are due to changes in the quality of the spironema or to changes in the resistance of the body. We are in complete ignorance of the state of the microbe in its latent phases, and we know little or nothing of the changes in the reacting power of the body. Milian, from the clinical aspect, appears to give adequate evidence that *one* of the factors which may determine an exacerbation is the direct stimulation of the dormant spironema by antisyphilitic treatment.[4] To such stimulation he gives the name of "biotropism." It is, of course, not suggested that this explanation accounts for more than a part of the exacerbations, but it evidently demands close study. That different doses of drugs produce different effects is common experience and is recognised in elementary therapeutics. It is hardly necessary to recall the stimulant effect of small doses of opium and the sedative influence of larger quantities.

Biotropism is the activation of microbes by chemical and other stimuli. Milian contrasts this process with Ehrlich's parasitotropism and organotropism, which conditions are *necro-tropic*—that is, they tend to the destruction either of the parasite or of the host. Biotropism is met with in many circumstances. I have personally seen a small dose of 914, administered as a gentle tonic, induce an acute attack of subtertian malaria, verified by the demonstration of the plasmodium in the blood, and by its rapid response to quinine. In this instance the patient had no idea that he was subject to malaria. The administration of 914 may stimulate to activity a latent streptococcal infection in the throat, with the result that at the end of nine days a tonsillitis and scarlatiniform erythema develop with pyrexia, the syndrome being indistinguishable from scarlet fever. This phenomenon has occurred more than once in my hospital experience, and it is commonly regarded as evidence of arsenical poisoning. It is obviously not so for it disappears under more intense treatment with arsenic and is quite different from the diffuse moist universal salvarsan dermatitis which only occurs after a *course* of arsenobenzol treatment. Mercury and bismuth, and occasionally arsenic, may stimulate septic organisms in the buccal cavity and thus cause grave stomatitis. Similarly, drugs may activate latent staphylococcal infection, &c., and the stimulation of the dormant viruses of herpes and zona by arsenic and other drugs is familiar. Arsenic, and particularly the trivalent arsenicals, such as 606 and 914, appear to be the commonest biotropic therapeutic agents, but both the other antisyphilitic remedies, mercury and bismuth, are not infrequent offenders.

"Provocative" Injections of the Arsenobenzols.

The simplest example illustrating the theory of the activation of syphilis by treatment is afforded by the commonly used "provocative" injections.

In cases in which the Wassermann reaction has been rendered negative by treatment, a small dose of 914 given after an interval of some months is frequently followed by a positive reaction. The most satisfactory time for this examination is about the fourteenth day after the provocative dose. It is not too much to assume that such positive reactions indicate the activation of groups of spironemata which have been lying dormant. Such a positive reaction may last for some days to some months, and often yields to further treatment by larger doses of the drug. It is also noteworthy that in cases where mercury has rendered a blood reaction negative, the administration of 914 without any interval may activate a focus not touched by the mercury and again give a positive reaction. These observations are commonplace, but they support the thesis.

There is evidence that not only drugs but also infectious diseases may activate a dormant syphilis and produce a positive Wassermann reaction. Milian quotes Neuda's case in which a negative blood reaction in an old syphilitic patient became positive during an influenzal pneumonia, and Marini's case in which typhoid fever brought out a papular syphilide with a positive Wassermann in a patient who was not known to be luetic. It has been suggested that some of the positive reactions occurring in certain acute fevers may be examples of biotropism—viz., the activation of a latent syphilitic infection. "Protein shock" and the vaccines are also known to bring out a positive Wassermann reaction in rare instances.

Conflict Between Drug and Microbe: Jarisch-Herxheimer Reaction.

About 30 years ago Jadassohn and Jarisch described the intensification of a syphilitic roseola under the influence of injections of grey oil. The importance of this observation was not realised until the frequent occurrence of a temporary augmentation of the cutaneous and mucous membrane manifestations of syphilis after treatment by 606 focused attention upon it. Herxheimer's work led to his name being associated with that of Jarisch. These reactions are much more frequent under arsenobenzol therapy than with mercury, and they occur commonly at the beginning of a course—that is, with insufficient treatment.

Milian has shown in a striking manner that bismuth may cause a Herxheimer reaction. He has placed in the museum of the St. Louis moulages representing two gummatous ulcers of the skin before and after the administration of two intramuscular injections of bismuth. One lesion was the size of a franc and the other as big as a two-franc piece. Instead of the ulcers retrogressing under the treatment they doubled in size, becoming at the same time redder and with increased discharge.

No one doubts that such reactions occur in visible cutaneous and mucous membrane lesions, but it does not appear to be so generally realised that the same type of phenomenon occurs in syphilis of the brain and peripheral nerves, in the liver, and in the heart. This is the result of the common failure to appreciate the fact that in the stage of generalisation every organ is invaded by the spironema and reacts more or less characteristically to it. Formerly the Herxheimer reaction was explained by the liberation of endotoxins from the microbes, but it is now recognised that it is evidence of a "therapeutic conflict" between the virus and the drug, and that the drug is insufficient to destroy the organism. Or, as Milian puts it, "it is a stimulation of the germ by a medication which is insufficient either as to dose or as to nature." Such therapeutic conflicts are accompanied by elevation of the temperature, with rigors, sweating, and general malaise, which may simulate malaria, but beyond the occurrence of vomiting and diarrhœa there is no evidence of arsenical intoxication. These reactions may occur without any visible cutaneous or mucous membrane manifestation.

The series of charts in "Le Biotropisme" recall reactions familiar to those who have had the opportunity of following cases under treatment in the wards of a hospital. In the simplest and commonest there is only one rise of temperature, perhaps to 102° or 103°, after the *first* dose of 914. In other cases a similar rise follows each *increase* in the dose. In some instances the temperature remains elevated with doses of 0·3 g. to 0·6 g., but after a profound reaction to one or more doses of 0·9 g. there is no further pyrexia. One striking chart shows intense reactions (T. 104°–105°) to doses of 0·3 g., and the production of a continued syphilitic pyrexia which was completely abolished by intramuscular injections of bismuth. The continued fever having been eliminated by bismuth it was possible to resume arsenical treatment without untoward symptoms. Another equally important chart shows repeated high temperatures (104°, 105°) after doses of 0·3 g. of 914, which were entirely absent with daily injections of cyanide of mercury (0·01 g.), whereby the resumption of treatment by 914 up to doses of 0·9 g. became possible. These observations show that in certain cases bismuth and mercury have a more powerful effect than arsenic, and demonstrate the great value of careful thermometric observations which unfortunately are impossible in an out-patient clinic.

Jaundice, Syphilitic or Toxic?

Warthin [3] tells us that the occurrence of a mild degree of atrophic hepatitis is very common in latent syphilis. The percentage of cases in his material in which the liver is involved appears to be on the increase, particularly in those given a modern treatment with arsenic. There may be no symptoms; for so large an organ as the liver may still retain a sufficiency of healthy tissue to carry on its functions. On the other hand, there is no doubt that arsenic itself may damage the liver, and such toxic action has long been a source of anxiety to all engaged in the modern treatment of syphilis. There are, therefore, two distinct types of jaundice, the more common syphilitic, the rare toxic, and it may be very difficult to distinguish them.

In a recent communication Schamberg [5] states that seven fatal cases of acute yellow atrophy occurred in one clinic during the past year, and states that such fatalities can only be avoided by small doses of the drug, the maximum for 914 being 0·6 g. Harrison,[6] at the Medical Society in February last, is reported as saying "For *syphilis affecting the liver* arsenobenzol compounds were contra-indicated." (The italics are mine.—J. H. S.) On the other hand, Milian holds that 90 per cent. of the cases of jaundice which occur during antisyphilitic treatment are merely the awakening of a dormant syphilitic hepatitis and as such require intensive treatment. He cites the following case which appears to be incontestable:—

In consultation with Dr. Ravaut he saw a patient with secondary syphilis, in whom a well-marked jaundice had appeared during treatment with 914, a dose of 0·75 g. having been reached. In view of the jaundice, Dr. Ravaut had decreased the dose to 0·15 g., followed by 0·3 g. In spite of this reduction the icterus increased. The case is described as one of typical afebrile obstructive jaundice, with decolorisation of the stools, &c., but with no evidence of arsenical intoxication. On Milian's advice doses of 0·9 g. and 1·05 g. were given, diuresis was established, and the jaundice rapidly disappeared. He maintains that this was a case of syphilitic hepatitis aggravated by small doses of 914, but which yielded at once to more intensive treatment.

In this connexion it is interesting to mention that Lafoucade, J. Fouguet, and Nativelle [7] report 23 cases of jaundice occuring during antisyphilitic treatment, of which only five were actually under arsenobenzol, the remainder being under mercury or bismuth, and none of them had recently had arsenical treatment. They therefore conclude that jaundice is not more frequent under arsenic than under mercury or bismuth (a conclusion not confirmed by my own experience). The sequel is important, as it strongly supports Milian's thesis. Thirteen of these cases had developed jaundice while having injections of grey oil. They each received a course

of arsenobenzol, and the icterus disappeared in every case, usually after the second or third dose.

It is obvious that very few clinicians would feel justified in following the admirable example of these observers, and the matter can hardly be further advanced until we have some reliable means of determining the relationship between indifferent excretion and toxic manifestations. Some work of N. L. Lloyd at Guy's Hospital [8] tend to show that Abelin's reaction, which can be applied in out-patient practice, may prove of assistance in this respect. In any case the subject demands carefully controlled investigation.

Cardiovascular Syphilis: "Heart-block."

That syphilis is an important cause of disease of the heart and vessels is well recognised, and there seems to be little doubt that these affections are on the increase. It has been suggested that modern arsenical treatment alters the life-history of the spironema in the body (Sarbo[9]). Langer's report states that while there was disease of the aorta in 33 per cent. of syphilitics seen in the post-mortem room in 1907 (that is before salvarsan), the percentage had risen to 63 per cent. in 1915 and 83 per cent. in 1925.[10] These figures are supported by records from other pathologists. It may be argued that there is more care taken in investigating these cases, and that the technique has greatly improved, but my own experience, which I feel sure will be confirmed by others, is that as far back as 1907 pathologists of repute were fully alive to the occurrence of syphilitic endarteritis, &c., and the improvement in histological technique cannot account for the remarkable figures quoted above.

In addition to disease of the vessels and cardiac valves there is increasing evidence that the myocardium is frequently involved. Such involvement may be without symptoms, but tachycardia and arrhythmia are common and "heart-block" occasionally occurs. It is now evident that cardiovascular syphilis is responsible for more deaths than general paralysis and tabes.[11] Myocarditis may be primary or secondary to endarteritis of the coronaries. "Heart-block" may be caused by disease of the vessels supplying the bundle of His, or by actual gumma or fibrosis in that region. It is said that the trivalent arsenicals have caused "heart-block" in patients free from the condition, and it is suggested that these drugs act directly on the bundle of His. It, however, seems much more reasonable to explain the phenomenon as being caused by the arsenic stimulating dormant spironemata in the involved area. It is stated that neither the pentavalent arsenicals nor bismuth produce this effect upon the heart.

Renal Conditions.

It is now understood in clinics that simple albuminuria, often of syphilitic origin, is no contra-indication to treatment. The albuminuria usually clears up. In grave arsenical intoxication suppression of urine may occur, and Milian has published a case of grave anuria during mercurial treatment. He believed this to be due to septic absorption from a severe stomatitis.

Nervous Affections: Neurorecurrences.

In the early days of salvarsan treatment it was noticed that symptoms of the affection of cranial nerves and of the central nervous system sometimes occurred after treatment by injection. These recurrences were certainly more frequent than under mercurial medication. Auditory and facial nerve paralyses were the commonest but the oculomotor nerves were also affected. I put on record cases of paraplegia, and have seen hemiplegia. It was soon established that these neurorecurrences were more frequent in patients who had been insufficiently treated by arsenic, and that they usually cleared up with further injections of the remedy.

Some of Milian's cases strongly support this view, and one is so instructive that I may be pardoned by giving a brief précis of the details.

A woman aged 35, the daughter of a general paralytic, suffered intensely from migrane which prostrated her for 24 to 48 hours at frequent intervals. Although her general health was otherwise very good, her doctor suspected the syphilitic origin of these headaches, and gave her a dozen intravenous injections of cyanide of mercury. The result was almost magical, and the migrane did not recur. The patient went for a holiday and treatment was suspended. On her being seen three months later, she was found to be suffering from grave hemiplegia with aphasia, which has since gone on to contracture. There appeared to be no doubt that the treatment had determined the more grave affection, and the medical man regretted his interference. In his comment on this case Milian insists that it is not the treatment but the insufficiency of the treatment which should be blamed. Not only was treatment stopped too soon but the patient was allowed to go away far from medical advice without even being ordered mercury by the mouth.

A case of paraplegia occurring in a young man during a moderate course of treatment is also detailed. In this instance the paraplegia seems to have been determined by a chill. It was complete, with retention of urine and incontinence of fæces. Here an intensive treatment by arsenicals and mercury cyanide in combination was followed by intravenous injections of arsenobismuth. The patient was completely cured of his paralysis in six months.

The author points out the importance of studying the methods of treatment which have been employed before the outbreak of fresh symptoms. An indication will often be thus obtained as to the advisability of increasing the dosage of the previously used drugs or what is often better, *to change the antisyphilitic medication* (the italics are Dr. Milian's.—J. H. S.).

Conclusions.

The absolute cure of syphilis—i.e., the complete destruction of all the spironemata in the body—is rare. The value of the arsenobenzols lies in their rendering an active syphilis latent more rapidly than any other form of medication. Ehrlich's therapeutic doses—0·015 g. per kg. of body-weight for the neosalvarsan group (914), and 0·01 g. per kg. for the salvarsan series (606), are usually quite safe; the parasitotropic and organotropic properties are in the approved ratio. The intravenous injection of these powerful drugs in *adequate* doses demands great care, and the proper preparation and competent observation of the patient—preferably in hospital. In a national scheme of treatment these ideal conditions, even if provided by private munificence, have to be surrendered to make the clinic attractive to, and wait upon the convenience of, a proletarian clientèle. Ambulant patients, who are only seen once a week and rarely, if ever, make the acquaintance of the clinical thermometer, must be given smaller doses and the less active preparations.

This sacrifice of efficiency to expediency has led to the evolution of strains of arsenic-fast spironemata and is attended with the risk of activating latent foci of infection. These risks may be modified, if they cannot be removed, by polytherapy—mercury, bismuth, and iodides being included with arsenicals in routine treatment.

Some of the early reactions hitherto thought to be evidence of intolerance to the drugs are merely activation of latent microbic (coccal, &c.) infections—e.g., the scarlatiniform, morbilliform, and other erythemata, or the stimulation of dormant viruses, such as herpes and zona. These all clear up with more active treatment. The most serious results of arsenical intoxication are salvarsan dermatitis and hepatitis. Neither are common. The dermatitis only occurs after a *course* of injections. Jaundice in the majority of cases is not an evidence of toxæmia due to arsenic, but is produced by the stimulation of a latent syphilitic hepatitis by inadequate treatment. The difficulty in distinguishing this has been discussed.

There is no question of the activation of latent syphilis by drugs, and this danger is greatest when the trivalent arsenicals are used, particularly in small doses. I entirely agree with Milian that *it is better to leave these cases alone* though they have a positive

Wassermann, *than to submit them to inadequate treatment.* By any combination of remedies we are not likely to eliminate infections of the nervous system, nor are we likely to approach the figures of Bruusgaard,[12] who found only 0·6 per cent. of general paralysis in untreated cases, whereas the usual figure in treated patients is 4 per cent.

To diminish the risks of infection we must probably continue to treat all syphilis in the active stage, but in later cases it seems reasonable to ask whether we should not pay more attention to the condition of the patient than to his Wassermann reaction.

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CLASSIFICATION OF FOUR THOUSAND EXPERIMENTAL OIL AND TAR SKIN TUMOURS OF MICE.

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AND

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THE tumours under consideration were produced in mice by the frequent application of pure and chemically treated carcinogenic agents having different degrees of potency. The number of benign and malignant tumours which have resulted from our experiments are :—

—	Animals utilised.	Benign.	Malignant.
Coal gas tars	800	93	106
Synthetic tars	8,800	1,086	1,281
Shale oils	10,000	977	307
Petroleum oils	6,100	183	43
Other oils, &c.	500	0	0
Pure compounds ..	2,900	15	6
Totals	29,100	2,354	1,743

About 8000 animals, of which approximately 1000 are bearing or have borne tumours, belong to incomplete experiments and are not included in the above totals, but the tumours of approximately 500 of these animals which have died have been examined microscopically and utilised for classification purposes.

The pre-tumour or pre-cancerous stage of the epithelium we do not propose to discuss here. The only observation we wish to make is that the more specimens we examine the more are we convinced that the gap between the benign and malignant is bridged by innumerable transitional cells. A single really good specimen will reveal a picture of a series of cells which would seem to have reached different stages in the development from the benign to the malignant, while many widely separated groups of cells may have simultaneously reached an equal degree of malignancy.

The tumours which we have met with can be divided into :—

(A) Tumours of the surface epithelium,
(B) ,, ,, ,, follicular epithelium,
(C) ,, ,, ,, sebaceous glands
(D) ,, ,, ,, connective tissue, and
(E) ,, comprised of mast cells.

In the first place the tumours are divided into benign and malignant. The classification of a tumour is, of course, not always easy. In difficult cases serial sections will sometimes permit one to make a definite diagnosis, but this procedure may fail to help, and in the latter case personal factors decide into which group a particular tumour shall fall. We have not deemed it necessary to institute an intermediary group of doubtful tumours because in the calculation of the carcinogenic potency of our agents due allowance is made for this contingency. Each group will now be briefly discussed, and in order to avoid repetition groups A and B will be considered together.

(*A*) *and* (*B*) *Tumours of the Surface and Follicular Epithelium.*

Benign tumours may be divided into: (1) tiny thickened areas of the epithelium which produce a small mound, just visible to the naked eye, on the otherwise smooth skin; (2) flat warts; and (3) papillomata, by far the commonest variety of benign tumour met with. The small foci of acanthotic epithelium which constitute the thickened areas of epithelium referred to in sub-group 1 we do not classify as true tumours on account of the tendency for regression of the epithelium to take place and leave again a smooth clean skin.

Malignant tumours.—These may be classified as follows :—

1. Spino-cellular, normal.
2. ,, with cystic tendency.
3. ,, ,, scirrhous ,,
4. ,, ,, hyaline ,,
5. ,, ,, basal-celled ,,
6. ,, ,, medullary ,,

Medullary tumours may be: spindle-celled, endothelial-celled, or alveolar, and if in these tumours keratinisation is not obviously present we classify as pure spindle-celled, &c. If two different areas of a tumour have each different histological features the tumour is classified as "mixed." If two such histological features are present in a single small area the tumour is called "intermixed." If two or more primary tumours occur in a single animal the ordinary term "multiple" is used. Multiple tumours may be of one or more than one variety, and both benign and malignant tumours may be present on the same animal.

A few details will now be given with reference to several of the more interesting examples of this group of tumours. In the first place it is to be noted that what we call flat warts are very often the result of hyperplasia of the follicular epithelium. If the surface epithelium is sufficiently hyperplastic to give the appearances of a flat wart the microscope usually shows that the tumour is already malignant. The majority of experimental malignant tumours of the surface and follicular epithelium are of the ordinary spino-cellular variety, and they are classified as normal spino-cellular epitheliomata. It is only when special histological features are present to a marked degree that the tumour is classified as spino-cellular with cystic, basal-celled, spindle-celled, &c., tendency. If there is little indication of any relation to the spino-cellular type the tumour is classified as pure cystic, basal-celled, spindle-celled, &c. New growths of follicular origin seem to have a greater tendency to become cystic than those originating from the surface epithelium, while medullary tumours do not often appear to originate from the follicles. Nothing further need be said concerning cystic, scirrhus (Fig. 1*), or hyaline tumours (Fig. 2), except in so

* The photographs are by R. Combes, Manchester University.

far as they are related to basal-celled and medullary tumours, the last two varieties, however, requiring a more detailed description.

Among our tumours it would appear that some at least have their origin from the basal layer of cells, although in no instance have we seen a tumour which could be classified as what is called a basal-celled epithelioma. We have frequently observed in the early stages of epitheliomatous disease of mice that the processes of cells penetrating into the dermis are in appearance identical with the cylindrical or somewhat cubical cells typical of a basal-celled epithelioma (Fig. 3). This condition is, of course, not peculiar to mice. The inward growing, densely cellular, irregularily edged, papillomatous processes, although bearing a resemblance to a basal-celled tumour, in all cases appear ultimately to become differentiated into the spino-cellular type of tumour. It has been suggested that these tumours might be classified as mixed basal-celled spino-cellular, but we prefer to consider them as spino-cellular tumours with a tendency to the basal-celled type.

The most prevalent variety of pure medullary tumours is the non-keratinising, small spindle-celled epithelioma, which has occurred in about 2 per cent. of our experimental skin tumours. If mixed and intermixed spindle-cell tumours are included the percentage is about 10. The large spindle-celled tumour is not so frequently met with. A typical spindle-celled epithelioma is very cellular, and consists of bundles of interlacing smallish spindle cells which in a single section may be cut in all directions (Fig. 4). The deep margin of the tumour is usually fairly well defined (Fig. 4) although it may be infiltrative (Fig. 5). Laterally, however, the tumour tends to spread far beneath the sound epithelium, and finally it blends imperceptibly with the subcutaneous connective tissues so that it is impossible to define the limits of malignancy. In a typical specimen the tumour cells approach right against the basal cells of the laterally intact surface epithelium. The fading away, so to speak, of the infiltrative edge of the malignant growth is of interest in relation to the lack of spindle-cell metastases. In what we call the pure spindle-celled tumours the absence of the so-called cell nests is a special feature, but a careful study will at times reveal commencing keratinisation of some of the cells. In the mixed and intermixed tumours keratinisation is, of course, part of the microscopical picture.

It is a significant fact that in almost every instance where we have found a pure spindle-celled tumour it has been situated on the edges of a fibrosed sore or has a frankly ulcerated surface. The tumours may by provided with thin-walled vessels which, together with hæmorrhages, are most numerous on the periphery. As the microphotographs show, the tumours are superficially not dissimilar to sarcomata, but that they have really originated from epithelial tissue is not usually difficult to demonstrate. Sometimes the spindle cells can be seen flaking as it were from the basal layer of cells (Figs. 6 and 7), and would thus appear to have their origin from the basal epithellum. This condition of affairs is, however, the exception.

Another special variety of the medullary tumour is the alveolar epithelioma (Fig. 8), wherein the tumour cells are divided into islets by strands of connective tissue.

The endothelial-celled tumour is the third variety of medullary epithelioma and like the alveolar tumour is only occasionally met with. While in the spindle-celled tumour the malignant cells blend and become indistinguishable from fibroblasts, so in the endothelial variety the malignant cells may become lost among the normal endothelial cells. It seems to us that both alveolar and endothelial varieties of malignant growth may be a stage in the metaplasia of the prickle cell to the resistant spindle cell, but in the majority of cases the metaplasia is direct.

With the onset of ulceration and concomitant sepsis complete healing of malignant tumours may take place, but total destruction of the tumour appears never to occur in the absence of ulceration. We have failed to observe regression of a tumour the surface epithelium of which was intact, but before the malignant growth is visible to the naked eye the microscope provides evidence that in some animals tiny primary foci of malignant cells may keratinise completely, no living cells remaining, so that in such cases the nucleus of a tumour would appear to be destroyed before any advance in growth is able to take place.

With the advent of ulceration and the entrance of bacteria a spino-cellular tumour may heal completely or it may heal in the centre and continue to grow at the edges. The malignant cell, however, would appear sometimes to adopt a special procedure in order to ensure survival—viz., it ceases to keratinise. When dealing with spindle-cell tumours one is struck by the absence of deep sepsis and necrosis of tissue, the dense wall of interlacing cells seemingly forming an impermeable barrier to the surface infective micro-organisms. Thus one is led to believe that the change to the spindle cell is a necessary consequence of the inability of the prickle cell to withstand sepsis; if metaplasia does not take place then that particular focus of malignant cells is liable to be totally destroyed. It is also probable that sepsis is the primary factor in causing the tumour to change from a keratinising to any of the varieties of medullary tumours, the relatively healthy undifferentiated cell offering a more effective resistance to bacteria than the keratinising (degenerating) highly differentiated cell. Consequently, central healing of an ulcerated medullary tumour is not commonly seen.

We have come to the conclusion that the change in morphology of the cells is often due to the influence of neighbouring cells, a fundamental biological phenomenon. Thus it would appear that when a spino-cellular tumour under the influence of sepsis changes its method of growth to that of spindle cells, the latter as they spread from the central ulcer beneath the intact surface epithelium cause this epithelium also to proliferate directly as spindle cells and not as squamous cells (Fig. 7). Also, we have seen that the malignant spindle cells as they infiltrate the connective tissue may gradually lose their morphological characteristics and become microscopically indistinguishable from fibrous tissue cells, but the significance of this phenomenon we are not at present prepared to discuss.

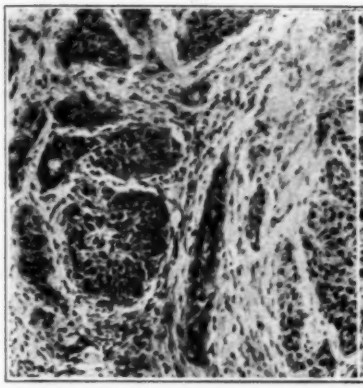
It has been mentioned that our tumours are rarely pure and on the contrary often possess several of the features described. For instance, we classify a tumour as a pure spino-cellular or a pure spindle-celled, while we have mixed spindle-spino-cellular and intermixed spindle-spino-cellular (Fig. 9), &c. An intermixed tumour of the kind referred to is really a spindle-celled tumour with definite areas of keratinisation, or if one prefers to look at the subject from another angle it is a spino-cellular tumour which, under the influence of some physico-chemical stimulation (sepsis), grows as a spindle-celled tumour.

It is to be noted that metastases which we have found in lymphatic glands, lungs, and once only in the kidney, have all been of the ordinary spino-cellular type. A tiny metastasis in the kidney is shown in Fig. 10, but there were also several larger ones in the same organ.

Of some interest was the simultaneous occurrence in an animal of an experimental mixed spindle-spino-cellular epithelioma and a breast spontaneous cystic adenocarcinoma. We consider it fairly safe to assume that the latter was a spontaneous tumour, although we have observed that female mice suffering from experimental epitheliomatous disease may on occasions show definite evidence of mastitis.

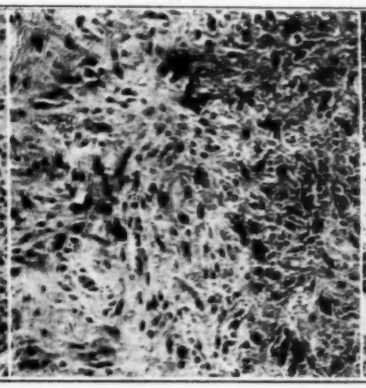
In Fig. 11 the spindle cell portion of the epithelioma is seen to be invading the cystic breast, which latter was elsewhere definitely carcinomatous. It was difficult to estimate which of the two tumours would ultimately have survived had the animal lived, although on the whole the

1



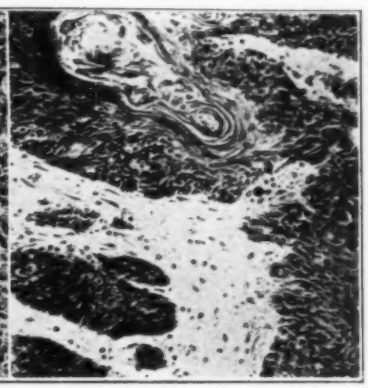
Spino-cellular epithelioma with scirrhous tendency. (× 185.)

2



Epithelioma. Hyalinisation. (× 110.)

3



Spino-cellular epithelioma with basal-celled tendency. (× 110.)

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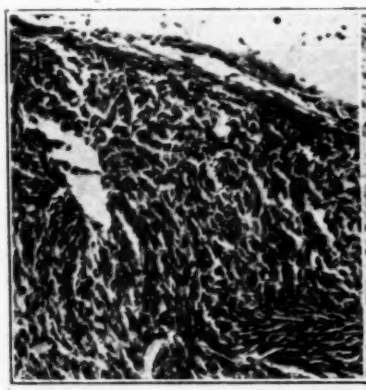
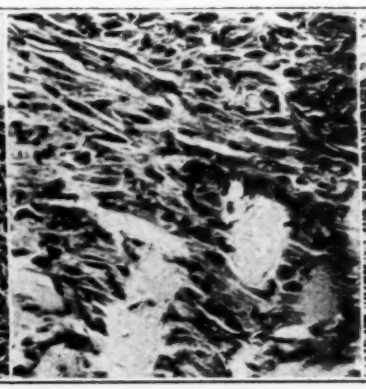


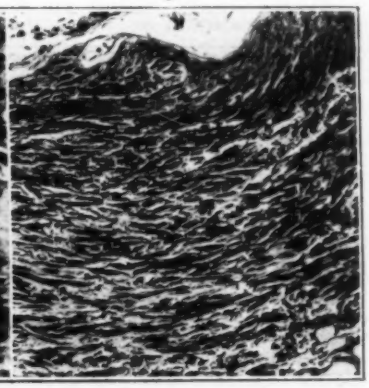
A pure spindle-celled epithelioma, showing interlacing bundles of malignant cells cut in different directions. Also shows well-defined deep margin. (× 180.)

5



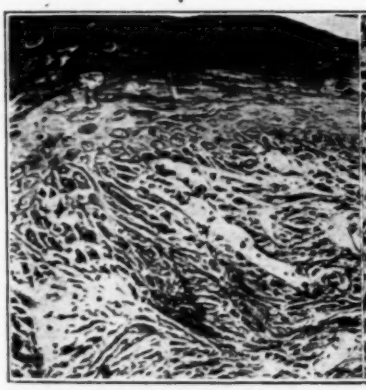
Spindle-celled epithelioma invading muscle. (× 310.)

6



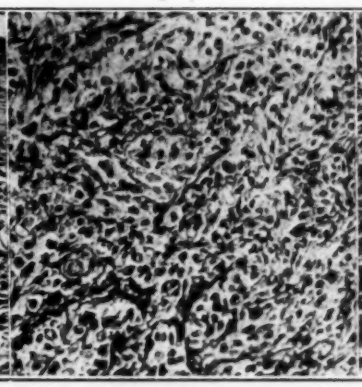
A spindle-celled epithelioma, showing flaking from basal layer of intact epithelium on edge of ulcer. (× 110.)

7



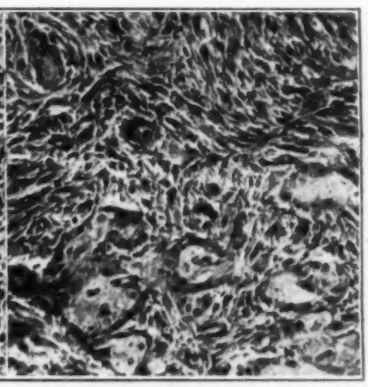
A spindle-celled epithelioma spreading beneath intact epithelium which is in turn proliferating directly as a spindle-celled growth. (× 110.)

8



Alveolar arrangement of cells of a medullary epithelioma. (× 110.)

9



Intermixed spindle spino-cellular epithelioma. (× 110.)

EXPERIMENTAL OIL AND TAR SKIN TUMOURS OF MICE.

10

Epithelioma metastasis in kidney (very exceptional). (× 110.)

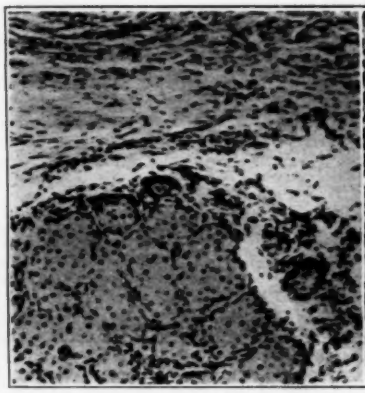
11

Invasion of spontaneous breast adenocarcinoma by spindle-celled epithelioma. (× 19·5.)

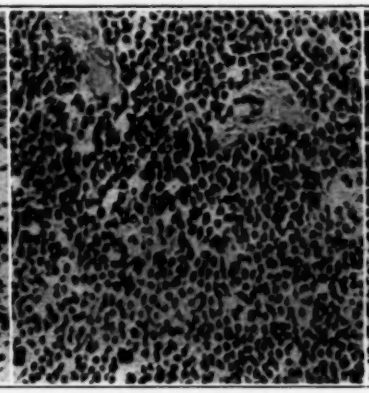
12

Portion of a cystic sebaceous adenoma. (× 120.)

14

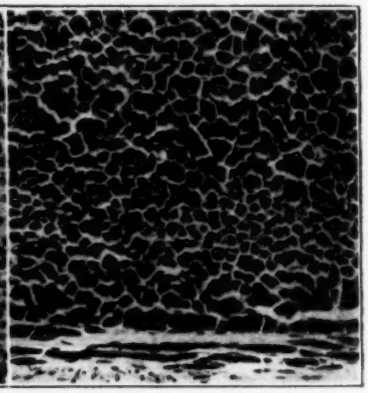


Portion of a sebaceous adenoma. (× 120.)



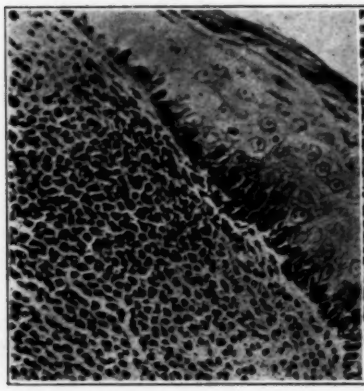
Round-celled sarcoma type tumour, probably not of epithelial origin, induced by the skin application of shale oil. (× 350.)

15



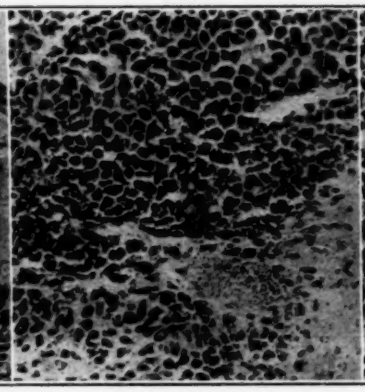
Normal mast cell tumour of skin. (× 110.)

16



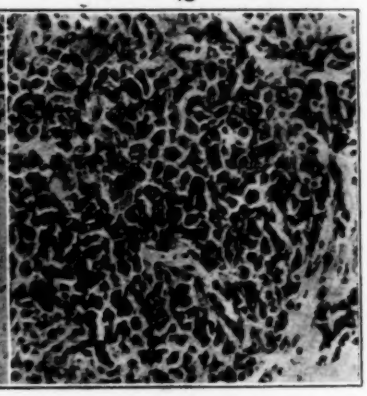
Modified mast cell tumour of skin. (× 350.)

17



Mast cell replacement of normal splenic tissue. (× 350.)

18



Mast cell infiltration of liver. (×350.)

EXPERIMENTAL OIL AND TAR SKIN TUMOURS OF MICE.

microscopic evidence was in favour of the epithelioma-tous spindle cells being in the process of destroying the breast carcinoma.

C. Tumours of the Sebaceous Glands.

Benign tumours only have been encountered. They are divided into: (1) sebaceous cysts, and (2) sebaceous adenomata. It is unusual for a tumour to be pure in type, a tumour of the sebaceous cells being generally a cystic adenoma. A cystic adenoma and a pure adenoma are shown in Figs. 12 and 13. As gas tars and synthetic tars tend to cause sebaceous cell atrophy tumours of this group are rarely seen in animals painted with such materials. Certain other agents appear to induce a sebaceous cell hyperplasia and occasionally definite tumours may subsequently arise. Medicinal liquid paraffin and oleic acid are examples of such agents, their action being apparently increased by the addition of certain insoluble aromatic hydrocarbons. As we do not consider that the development of a sebaceous adenoma is induced by the carcinogenic principle in our agents these tumours are excluded from our calculation of carcinogenic potency. However, we have only met with about 20 specimens up to the present time.

D. Tumours of Connective Tissue Origin.

No benign and only one malignant tumour of this group occurred among our animals. In this particular case there was no evidence that the tumour concerned was of epithelial origin, although it may have so originated. Microscopically it resembled a round-celled sarcoma. The history of the case was as follows:

Mouse 17719 was painted twice a week with a synthetic tar which had been treated by bubbling through oxygen at a temperature of 150–160° C. A wart developed during the 14th week of the experiment which later fell off and left an ulcerated surface. During the 28th week a small hard lump was palpable which was diagnosed as an epithelioma, and the animal died during the following week. A microphotograph of the tumour is shown in Fig. 14.

E. Tumours Composed of Mast Cells.

The invasion of the subcutaneous tissues and the corium by mast cells is a notable feature in the skin of animals painted with carcinogenic agents, but more so in the case of tars than in the case of oils. The extent of the invasion is usually roughly proportional to the amount of subepithelial inflammation present. Aggregation of these cells may give rise to definite tumours which may be visible to the naked eye and simulate small flat warts (Fig. 15). There is often a tendency for the cells to lose their basophile granules and to become smaller in size with a clearly defined nucleus, and when such changes are exaggerated they take on the appearance somewhat resembling a nævus cell. As in nævi the tumours may be situated directly beneath the epithelium (Fig. 16).

All such tumours appeared to be benign, but it is interesting to note that a diffuse infiltrative condition of the internal organs seemed to have been the cause of death of one of our animals:

Mouse 21079 was treated with bi-weekly applications of a 10 per cent. solution of synthetic tar B/10 in oleic acid and during the 14th week of the experiment developed a wart which showed evidence of malignancy within four days. The animal died eight days later, the malignant tumour having ulcerated. On post-mortem examination the spleen was found to be large and swollen with the normal tissue replaced by nodules of growth of a greyish appearance. The liver was slightly large and anæmic but showed no definite nodular new growth formation.

Microscopically the skin showed a small epithelioma which was evidently being rapidly destroyed by sepsis. In the subcutaneous tissues was a small mast cell tumour. The spleen showed a central mass of tumour with two lateral areas of blood which contained lysed patches of tumour cells. In the margin were remnants of comparatively normal splenic tissue. The tumour edge was, on the whole, sharply defined from the hæmorrhagic tissue. The individual tumour cells, where isolated, were round cells about 20 μ in diameter, and with a well-defined roundish nucleus 5–8 μ in diameter. Stained with hæmatoxylin the cells were packed with the granules and were identical in appearance to the modified mast cells so frequently found as a tumour in the subcutaneous tissues of mice painted with tar (Fig. 17). A noteworthy feature of the splenic tumour cells was that many of them were full of red blood corpuscles. The cells where crowded together were more irregular in shape and size. No definite mitoses were observed in the tumour cells. In the liver microscopic nodules of tumour cells were present and there were isolated cells infiltrating the liver parenchyma (Fig. 18). The cells were similar in appearance to those found in the spleen, but no intracellular blood-cells were seen.

Transmission of the condition to other mice was not attempted. Had such transmissions been tried we do not think for several reasons that we should have had any positive results.

THE EFFECT OF RIVANOL IN THE TREATMENT OF AMŒBIC DYSENTERY.

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RIVANOL (ethoxy-diamino-acridine-lactate) is a yellow dye-stuff with a powerful antiseptic action. It has been used as a local antiseptic in various septic skin conditions and in genito-urinary and other infections. More recently its employment in dysenteries and allied conditions of the lower gut has been advocated. Urchs[1] obtained good results in the treatment of tropical colitis by the use of rivanol solution injected rectally, and considered the benefit derived to be due largely to its antiseptic action on the superadded secondary infection. Peter[2] carried out further investigations with the drug, using the rectal route of medication in cases of colitis definitely proved to be due to infection with *Entamœba histolytica*. He observed rapid improvement in the general condition of these patients in two or three days, and the bowel symptoms also rapidly subsided, tenesmus being the first to disappear, usually by the second day. The frequency of the stools was not, he found, much influenced until after the second day, but after an average of five days' treatment usually only two or three formed stools were passed daily. Blood began to diminish by the second day and had entirely disappeared two days later; mucus was found to persist a day or two longer than the blood. A further beneficial effect was observed by him during treatment—namely, the disappearance of the tenderness and contraction of the large gut; this was usually completely relieved by the sixth or eighth day—the usual duration of the ordinary course of treatment. The microscopic findings confirmed the clinical observations, the vegetative forms of *E. histolytica* vanishing after the five days of treatment; they were never found when mucus had disappeared from the stools, and cysts behaved in a similar fashion. Provocative medicines were administered before the patients were discharged and repeated stool examinations carried out with negative results. No special diet was found necessary during the treatment, and at the beginning milk was usually given, the diet being increased as symptoms subsided. The average stay in hospital from the commencement of treatment was ten days. The concentration of the rivanol solution recommended was 1:10,000, this being found the most efficacious and the least irritating to the intestines.

The technique of rivanol administration is described by Urchs.[3] A preliminary cleansing enema being first given, 500–800 c.cm. of rivanol solution are run in slowly at body temperature and retained as long as possible, for at least 15 minutes. Peter considered the rectal method unsuitable in certain

cases with high bowel infection, and therefore commenced the oral method of medication, and gives a description of 34 cases so treated.[4] He found that on an average the patients so treated were amœbæ-free after four days, or at least no amœbæ could be found in the stools after this period, even with provocative medication followed by repeated daily examinations of the stools. The usual total amount necessary for cure in adults was found to be 0·843 g. of rivanol. Apart from the lethal action on the entamœbæ, a marked antispasmodic and anæsthetic property was observed, even more so than when the drug had been administered per rectum. Tenesmus soon disappeared, stools returned to normal, and all abdominal and colon tenderness subsided. The course of treatment recommended was to commence as soon as the diagnosis had been confirmed by giving a dose of Carlsbad salts; this was to be followed by 0·03–0·05 g. of rivanol every two hours until the second day, after which this dose was given three times a day for six to eight days. If, clinically and microscopically, marked improvement set in early this dose could be reduced; on the other hand, where diarrhœa and tenesmus persisted to the second or third day of treatment extra dosage was recommended. The highest dose used by Peter was 0·2 g., no ill-effect being observed. In chronic obstinate cases a second course for the sake of certainty was advised after an interval of a week. In a further communication[5] Peter describes the results of treatment in cases of enteritis and enterocolitis in which no definite causative agent could be discovered, the result in these cases being usually satisfactory, even in various diarrhœas of infants.

Experimental work on rivanol was undertaken by Wagner[6] in order to ascertain whether the drug attacked and destroyed *E. histolytica* or whether it merely exercised a restraining influence on the secondary infections caused by the accompanying micro-organisms. Observations were accordingly made both in vitro and in living animals. In vitro, rivanol proved to be the strongest direct amœbicide, a solution of 1:100 causing death of the amœbæ in 24 hours; in dilutions of 1:2000 the action began to fail. Yatren and emetine had to be used in strengths ten times that of rivanol in order to destroy the amœba in culture. In living animals (infected cats where the infection follows a very acute and serious course) the results agreed with those in vitro, a solution of 1:1000–1:1250 alleviating the course of the disease and in some cases completely healing the bowel infection. He considered the action to be a direct lethal one on the amœbæ.

Schaumann[7] demonstrated experimentally the spasmolytic action of rivanol, the colon of the living rat being found most suitable for this purpose. In order to observe the mode of action of the drug, pilocarpine (a nerve stimulant) and barium (chiefly a muscle stimulant) were used, the resultant spasm being relieved by rivanol and papaverine, and the results compared. Finally, experiments were carried out on the hypertonic bowel of rabbits suffering from advanced tuberculosis. He found the action of rivanol to be quite as strong as that of papaverine, the most effective dilution being 1:100,000. Rivanol in dilute solution was found to have a neutralising effect in the spastic hyperexcitability of the bowel, this action being due to an inhibitory effect on the sympathetic nerves. In large doses rivanol was shown to have, in addition to this action through the sympathetic nerves, a direct paralysing action on the bowel muscle, similar to the action of papaverine. He administered the drug to cats in doses of 5 mg. per kg. of body-weight per day during a period of four weeks without any ill-effect, thus showing that the oral route is apparently a safe method of administration.

Recently Weitzmann[8] has reported the use of the drug in four cases of amœbic dysentery, oral administration being employed in doses of 0·05 g. four times in the 24 hours for a period of six days. At the end of the six days' treatment the number of stools was found not to have diminished and the vegetative forms were still present and actively motile. He concludes from his series of cases that the brilliant results obtained by Wagner, Schaumann, and Peter in the treatment of dysenteries had not been confirmed.

Manson-Bahr[9] considers that rivanol injected per rectum in a strength of 1:2000 may produce results similar to those obtained by yatren, and recommends that ten or more such injections should be made in order to obtain satisfactory results.

Results Controlled by Sigmoidoscopy.

Investigations have been carried out by us in a series of cases of amœbic dysentery of different degrees of severity, the diagnosis in each case being confirmed by the finding of actively motile *E. histolytica* either in the discharge from the intestine examined fresh in the ward and in the laboratory or through the sigmoidoscope by means of Volkmann's spoon, scrapings being thus obtained direct from the base of the amœbic ulcers. In two of the cases (Nos. 1 and 12) where repeated examination of the fresh stool had failed to demonstrate the entamœbæ, typical ulcers were seen through the sigmoidoscope, and scrapings produced numerous actively motile entamœbæ, emphasising the importance of this method of investigation in arriving at a correct diagnosis in cases complaining of symptoms of dysentery. Careful note was also made of the appearance of the ulcers through the sigmoidoscope before treatment was commenced, and weekly or more frequent examinations by this method were carried out during the course of treatment, so as to observe visually the effect of rivanol on the bowel lesions. The stools were also inspected daily in the bed-pan, the time of disappearance of the mucus and blood being noted, and the length of time taken for the diarrhœa and tenesmus to subside observed. During treatment the patients were kept on milk diet until symptoms had subsided, after which the diet was gradually increased. The patients were all male.

Résumé of Cases.

CASE 1, a man from Kaliub, aged 23, complained of diarrhœa four times daily with blood, mucus, and tenesmus of three years' duration with sudden onset. The stools were negative for amœbæ by microscopic examination, but found positive in material obtained by spoon-scrape through the sigmoidoscope, which demonstrated small depressed amœbic ulcerations. This patient was put on rivanol, one capsule (0·025 g.), three times daily for 17 days, but although the stools became normal in appearance after a few days on rivanol, yet on the thirteenth day of treatment the sigmoidoscopic picture showed the same amœbic ulcers and a spoon-scrape was still able to demonstrate the presence of living amœbæ. Three days after stopping rivanol the sigmoidoscopic picture of the gut had improved, the ulcers gradually diminishing in size, so that after three weeks they could no longer be seen. Entamœbæ could not now be demonstrated either by the scrapings through the sigmoidoscope or by microscopic examination of the stools, but we were not satisfied that the case was cured, as there were still areas of hyperæmia in the gut, and also much sticky mucus. The patient was discharged, but on reporting again after two months he was found to be suffering from symptoms of dysentery. The sigmoidoscope now showed typical amœbic ulcers and the stools contained living amœbæ. He was put on a course of yatren treatment.

CASE 2, aged 60, was admitted to hospital complaining of diarrhœa, tenesmus, and loose yellowish stools with blood and mucus of four days' duration, the disease starting suddenly. Living *E. histolytica* were detected in the stools. The sigmoidoscope showed much mucus sticking to the bowel wall; underneath it were patches of normal mucous membrane, separating large depressed ulcerated areas. Scrapings contained living amœbæ. The patient was put on rivanol, one capsule (0·025 g.) three times daily, for a week. On the fourth day of treatment tenesmus disappeared and blood and mucus became scanty from the third day. The sigmoidoscopic picture after a week's treatment showed a slightly cleaner appearance of the ulcers. Rivanol was then increased to two capsules three times daily for a week, after which further slight improvement had occurred in the sigmoidoscopic appearance. Amœbæ disappeared from the stools on the tenth day of treatment; blood and mucus had disappeared by the end of the second week. Rivanol was given for a third week in increased dose—i.e., three capsules thrice daily—and during this week the stools continued to be

quite normal in appearance with no amœbæ, even on scraping through the sigmoidoscope. On the completion of this intensive three weeks' course of rivanol the sigmoidoscope showed the ulcers still there, but even a scraping failed to discover living amœbæ, only dead amœba-like bodies being seen. Rivanol was then discontinued for one week, after which the picture of the ulcers had improved, but a spoon-scrape now demonstrated the presence of living entamœbæ. The patient was then put on a course of emetine and stovarsol.

CASE 3, aged 35, was admitted to hospital complaining of diarrhœa 20 times daily, and tenesmus, with blood and mucus in the stools. The history of the onset was sudden, and the duration of the complaint was 45 days. The stools contained living *E. histolytica*, trichomonas, and pus cells. The blood showed a leucocytosis of 13,800. The sigmoidoscope revealed two or three elevated patches of muco-hæmorrhagic material which, on being swabbed away, revealed small amœbic ulcers underneath. Rivanol, one capsule (0·025 g.), was given thrice daily. Blood, mucus, and tenesmus diminished on the third day, the latter disappearing entirely on the fifth day. After a week of this treatment the sigmoidoscopic picture remained the same. Rivanol was then increased to two capsules three times daily by mouth for another week, after which the ulcers were seen to be somewhat smaller, but the scrapings still contained *E. histolytica*. Rivanol was further increased to three capsules (0·075 g.) thrice daily. Next day the blood and mucus had disappeared, and no amœbæ were found in the stools. At the end of the third week, after the completion of this intensive rivanol course, the sigmoidoscope still showed ulcers, but scrapings from these only demonstrated immobile amœbæ-like bodies. Rivanol was then stopped for one week, at the end of which time the same ulcers were seen on sigmoidoscopy and material obtained by scrapings now contained living *E. histolytica*. A course of emetine and stovarsol was then given.

CASE 4, aged 40, was admitted to hospital complaining of diarrhœa, five to seven times daily, with blood, mucus, and tenesmus of two months' duration. The onset of the disease was gradual. The stools contained blood and mucus, and the microscope revealed *E. histolytica* and lamblia. Sigmoidoscopy showed depressed square-shaped hæmorrhagic ulcers, with healthy mucous membrane in between. Rivanol one capsule (0·025 g.), thrice daily, was given for ten days by mouth, after which time the stools still contained *E. histolytica*. Rivanol was stopped and the patient was put on yatren enemata and stovarsol, but he died a week later from right lobar pneumonia.

CASE 5, aged 45, was admitted complaining of diarrhœa, 20 times daily with blood, mucus, and tenesmus. These symptoms had lasted five months, the onset being sudden, but he stated that he had had frequent previous attacks. His liver was tender and he had chronic nephritis with general weakness, œdema of the legs, pufflness of the lids, dyspnœa, and cough. Living *E. histolytica* were found in the stools. On sigmoidoscopy, the large gut was found very patulous, while the mucous membrane showed many depressed hæmorrhagic areas and small punched-out ulcers. The mucous membrane in between was coated with mucus which could easily be swabbed away, exposing healthy mucous membrane underneath. Rivanol, one capsule (0·025 g.) by mouth, was given thrice daily. After two weeks' treatment much the same sigmoidoscopic picture was seen, the mucous membrane being studded with small punched-out ulcers having yellowish bases in some and hæmorrhagic spots in others. The rivanol treatment was continued for 18 days, after which the sigmoidoscopic picture had improved somewhat. The stools looked normal in appearance, but living amœbæ were still present. Stovarsol was therefore started, and 12 days later sigmoidoscopy showed a normal mucosa, and scraping was negative for amœbæ.

CASE 6, aged 42, complained on admission to hospital of diarrhœa 10 to 12 times daily with blood, mucus, and tenesmus. These symptoms had commenced gradually ten days previously. The stools were liquid, containing blood, mucus, and living *E. histolytica*. Through the sigmoidoscope tiny elevations with central pits were observed, and with the aid of the magnifying glass they were seen to be very early amœbic erosions, very little ulceration having yet taken place. Rivanol, one capsule (0·025 g.), three times daily, was given by mouth for ten days, on the fourth day of which treatment blood, mucus, and tenesmus had disappeared. The stools became solid on the seventh day. Amœbæ had disappeared from stools by ordinary microscopic examination without scrapings by the ninth day of treatment. On the tenth day tenesmus reappeared, and the sigmoidoscope revealed small areas indicating amœbic infection of the bowel wall. Material by scraping was positive for *E. histolytica*. The patient was then put on stovarsol.

CASE 7, aged 27, complained on admission to hospital of diarrhœa seven times daily with blood, mucus, tenesmus,

TABLE SHOWING RESULT OF TREATMENT BY RIVANOL IN AMŒBIC DYSENTERY.

No.	Amœbic ulcers seen by sigmoidoscope.	Entamœbæ present in sigmoidoscopic scrape.	Entamœbæ in stools (lab. or ward).	Treatment (rivanol in grammes).	Result of treatment.
1	+	+	–	0·025 t.d.s. 17 days.	Relapse after 2 months entamœbæ + ulcer present.
2	+	+	+	0·025 ,, 1st week. 0·05 ,, 2nd ,, 0·075 ,, 3rd ,,	After a week's rest entamœbæ present in stools.
3	+	+	+, also trichomonas.	0·025 ,, 1st ,, 0·05 ,, 2nd ,, 0·075 ,, 3rd ,,	After a week's rest entamœbæ +.
4	+	+	+, also Lamblia.	0·025 ,, 10 days.	Stools showed entamœbæ.
5	+	+	+	0·025 ,, 18 ,,	Stools still + for entamœbæ.
6	Very small ulcer.	+	+	0·025 ,, 10 ,,	Do.
7	Small ulcer +.	+	+	0·025 t.d.s., enema 1 : 10,000 (1 week, then enema stopped) continued per os 0·025 t.d.s. for 12 days.	Stools + for entamœbæ.
8	+	+	+	0·025 t.d.s. 1s week. 0·05 ,, 2nd ,,	Entamœbæ – and ulcers healed. Relapse 2 months later with large ulcers and many amœbæ.
9	One small ulcer.	+	+, also Lamblia.	0·025 ,, 20 days.	Ulcer healed. No symptoms for 6½ months.
10	Normal membrane, only sticky mucus.	–	+	0·025 ,, 10 ,,	Negative entamœbæ still negative 2½ months later.
11	Very small ulcer. +	+	+, also Morgan.	0·025 ,, 9 ,,	Do.
12	+	+	–	Enema 1 : 2000, stopped after 1 week local irritation.	Local irritation compelled stoppage of treatment.
13	Punched out ulcers + diffuse inflammation.	+	+, also Flexner.	Rivanol 0·025 t.d.s.; 9 days' wash 1 : 10,000 m.c. 9 days.	Same appearance of ulcers as on admission. Entamœbæ still present.

AVERAGE DURATION OF SYMPTOMS AND SIGNS AFTER STARTING RIVANOL TREATMENT.

	Blood.	Mucus.	Diarrhœa.	Tenesmus.
Days	3·3	3·3	5	3

and colicky pains. The onset had been gradual and the condition had persisted for two years. The stools, in addition, to mucus and blood, contained living *E. histolytica*, and the mucous membrane on sigmoidoscopy showed small circular hæmorrhages and tiny punched-out ulcers, with here and there some blood-stained mucus adhering in the bowel wall. Scrapings under the microscope showed living amœbæ. The patient was put on rivanol, one capsule (0·025 g.), thrice daily by mouth, and rivanol rectal enema 1:10,000 retained as long as possible. One week later, through the sigmoidoscope, the same picture was seen with some superadded inflammation and sticky mucus low down in the gut, probably the result of irritation from the rivanol enemata which were then stopped. After 12 days of rivanol per os the mucous membrane still looked unhealthy with sticky mucus. Rivanol was stopped and an emetine course given, and under this treatment the ulcerations disappeared.

CASE 8, aged 45, was treated as an out-patient, and attended in the ward every week for observation. He complained of attacks of diarrhœa with tenesmus, mucus, and blood in the stools, these symptoms coming and going irregularly throughout a period of six months. The first attack came on suddenly, the average daily number of motions being seven or eight. The stools contained mucus and blood. Microscopical examination revealed the presence of living *E. histolytica*. The sigmoidoscope showed scattered, depressed amœbic ulcerations with healthy mucous membrane in between; spoon-scrapings contained living entamœbæ. The patient was given one capsule of rivanol (0·025 g.) thrice daily for the first week and two capsules thrice daily for the next two weeks. Tenesmus disappeared on the second day of treatment, and on the third day the stools had regained their normal appearance and consistency, and blood and mucus had disappeared. After the first week of rivanol treatment the sigmoidoscope showed much improvement in the ulcers, and entamœbæ were not found by a spoon-scrape. A week later the mucous membrane appeared quite healthy, and continued so through the following weeks. When the patient was seen a month later, after stopping the rivanol, he did not complain of anything, and the sigmoidoscope showed a normal mucosa. The patient reported, two months after completion of the rivanol treatment, with a return of his dysenteric symptoms; the sigmoidoscope then revealed extensive amœbic ulcerations, and active *E. histolytica* were seen under the microscope. He was put on yatren treatment.

CASE 9, aged 28, was admitted to hospital with severe anæmia and diarrhœa of one month's duration without blood or mucus, but with tenesmus. The onset of the diarrhœa was gradual and the number of the stools varied from seven to ten a day. The stools were loose and pale in colour. No naked-eye mucus or blood was seen, but the immediate examination in the ward and later in the laboratory revealed the presence of living *E. histolytica*. The sigmoidoscope showed a healthy mucous membrane except for the presence of a little depressed hæmorrhagic ulcer 20 cm. up. The patient was put on rivanol capsules by the mouth (each 0·025 g.), one capsule thrice daily for 20 days. On the twelveth day of treatment the diarrhœa had disappeared. On the last day of rivanol treatment the patient showed by sigmoidoscope a normal mucosa. He was put on ferrum redactum for his anæmia, and when seen six and a half months later he did not complain of any symptom. The sigmoidoscope then showed a few hæmorrhagic spots low down in the gut, but the material obtained by the spoon did not show any *E. histolytica*.

CASE 10, aged 40, was admitted to hospital complaining of colicky pains in the abdomen, tenesmus, and diarrhœa with mucus and blood, lasting for five months. The onset of the disease was gradual, the number of stools being 12 to 15 a day. The naked-eye examination of the stools showed the presence of blood and mucus. Immediate examination in the ward and later in the laboratory revealed the presence of *E. histolytica*. No amœbic ulcers were seen by the sigmoidoscope, the mucous membrane appearing normal except for some mucus sticking to it; bleeding was readily produced during the passage of the sigmoidoscope. The patient was given rivanol by the mouth, one capsule (0·025 g.) thrice daily for ten days. On the second day of treatment the diarrhœa dropped from 12 times to an average of three times daily. On the fourth day the appearance of the stools was almost normal, and on the fifth day tenesmus had ceased and blood and mucus were absent; by the tenth day the stools were quite solid and normal in appearance. Examination of material obtained by spoon-scrape before the patient was discharged did not show any living *E. histolytica*. Re-examined two and a half months later, he complained of no symptoms, and the sigmoidoscopic picture showed only a moderately congested mucosa, scrapings being still negative for *E. histolytica*.

CASE 11, aged 45, was admitted to hospital complaining of diarrhœa, colicky pains in the abdomen, tenesmus, and blood and mucus in the stools. The onset was gradual and the duration of the symptoms only five days. The patient passed three to four motions daily. The stools were liquid and contained blood and mucus and living *E. histolytica*. Morgan's bacillus was also isolated on culture. The sigmoidoscope showed abrasions in the mucosa and also small depressed pits with slightly elevated inflamed rims. The patient was given rivanol, one capsule (0·025 g.) thrice daily for nine days. Diarrhœa, tenesmus, blood, and mucus disappeared on the third day of treatment, and by the fifth day the stools had regained their normal appearance. After the course was completed the picture of the gut did not reveal any abnormality to the sigmoidoscope on several occasions. The patient was seen two and a half months later, complaining of no symptoms. The sigmoidoscope showed no ulcerations, and the spoon-scrapings were negative for *E. histolytica*.

CASE 12, aged 18, was admitted to hospital complaining of diarrhœa, with blood, mucus, and tenesmus for 40 days. The onset of the disease was sudden, the number of motions varying from two to eight a day. The patient gave a history of relapses during the preceding five years. Small, scattered, punched-out yellow ulcers and hæmorrhagic depressed areas were seen through the sigmoidoscope, with healthy mucous membrane in between. The patient was put on rivanol wash by rectum in a strength of 1:2000 daily, but this was stopped after a few days owing to his complaint of local irritation, intense inflammation being seen by the sigmoidoscope. The patient was then put on stovarsol treatment.

CASE 13, aged 19, was admitted markedly emaciated, complaining of diarrhœa with blood, mucus, and severe tenesmus. The onset of the disease was sudden, commencing 15 days previously. The daily number of motions was four. The stools were mixed with blood, mucus, and pus. Living *E. histolytica* were detected in the stools in the ward and laboratory, and *B. dysenteriæ* Flexner was also isolated on culture. The sigmoidoscopic picture showed numerous punched-out ulcers typical of amœbic dysentery. The mucosa between these amœbic ulcers was moderately congested, bleeding readily, and covered with blood-stained mucus, an appearance typical of bacillary dysentery. The patient was put on rivanol capsules (0·025 g.) thrice daily for nine days and rivanol enemata 1:10,000 twice daily for the same period; at the end of it the same punched-out ulcers were still seen in the gut, and amœbæ were seen microscopically.

In only three cases (Nos. 9, 10, and 11) have we been able to obtain results that may be looked upon as satisfactory; the period of observation in these three cases, however, is much too short for anything like a cure to be claimed. No. 9 has been free from symptoms and has shown no pathological sigmoidoscopic changes during a period of six and a half months, while Nos. 10 and 11 have only been observed free from symptoms for two and a half months. The bowel lesions in these three cases were very slight from the first, No. 10 appearing normal sigmoidoscopically. In all the other cases in our series, except No. 12 where treatment had to be discontinued owing to local irritation, adequate doses of rivanol were administered over a sufficiently long period, but within a short time of the termination of the treatment actively motile *E. histolytica* were readily demonstrated in the material obtained from the intestines. In one case (No. 8) the ulcers were observed to heal during rivanol treatment and symptoms to disappear, but a relapse occurred two months later, when large amœbic ulcers were again seen in the lower bowel and actively motile entamœbæ were demonstrated microscopically. In three cases (7, 12, and 13) rivanol enemata were employed. A strength of 1:2000 was found to produce marked local irritation both subjectively and as seen through the sigmoidoscope. A strength of 1:10,000 was used in Cases 7 and 13 in addition to rivanol orally (0·025 g. thrice daily) given at the same time. Even this combination did not effect a cure. Very large oral doses were given in Cases 2 and 3, rivanol 0·025 g. thrice daily being given for the first week, 0·05 g. thrice daily for the second week, and 0·075 g. thrice daily for the third week. No toxic symptoms resulted from these large doses but entamœbæ still persisted after the completion of the course.

Relief of Symptoms by Rivanol.

The symptoms of diarrhœa, tenesmus, and passage of blood and mucus were very greatly relieved during the rivanol treatment and, as a result, these patients experienced very considerable comfort. The first symptom to be relieved was tenesmus, which was found to disappear in an average of three days from the commencement of the treatment. Naked-eye blood and mucus next disappeared from the stools, this taking place in an average of 3·3 days; the stools, however, did not regain their normal consistency until, on an average, five days after the commencement of the rivanol treatment.

The relief of symptoms in these cases is doubtless due to the anæsthetic and antispasmodic properties of the drug. The cleansing and healing effect observed on the ulcers is probably due to the antiseptic action of the drug on the superadded infection. There seems unfortunately to be only a very mild specific lethal action on the entamœbæ themselves, as in most cases, after a short period of rest from the treatment, actively motile entamœbæ can again be readily demonstrated.

The drug has been employed by us for its sedative action in cases of rectal bilharziasis where tenesmus has been a marked and troublesome symptom.

Conclusions.

Rivanol administered as a local application rectally has been found to be irritating to the mucosa in a concentration of 1:2000, marked hyperæmia of the rectal mucous membrane as viewed through the sigmoidoscope having resulted. In a dilution of 1:10,000 no lethal effect on the entamœbæ has been noted.

Rivanol administered orally, even in doses as high as 0·075 g. thrice daily, has not been found to produce any toxic effects on the individual nor has it been observed to have any markedly lethal action on the entamœbæ. In only three very mild amœbic infections were we able to get rid of the dysenteric symptoms and free the bowel from *E. histolytica* for any considerable period. All our other cases soon showed a return of the symptoms and their intestines were found still to harbour active vegetative forms of *E. histolytica*, either immediately or shortly after discontinuing the drug. Marked relief from symptoms was, however, experienced in most cases during the course of treatment, tenesmus, blood, mucus, and diarrhœa soon disappearing, usually to return shortly after stopping the rivanol.

We consider that the antispasmodic and antiseptic action of the drug may with advantage be utilised for the relief of colic and tenesmus, and for assisting in cleansing the bowel of some of the superadded infection in various dysenteric conditions where lower bowel symptoms are a marked feature of the disease.

We wish to express our thanks to the following house physicians for their assistance in carrying out the investigations on these cases: Dr. Nishokaty, Dr. Shukry, and Dr. Fikry.

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MOTOR ACCIDENTS AT ALTRINCHAM.—The General Hospital at Altrincham, in mid-Cheshire, stands upon a road much used by motor traffic, and consequently receives many accident cases. In 1929 it took in 156 sufferers from road accidents, who stayed for a total of 3639 days; one of them occupied a bed for 11 months, and others remained for eight and nine months.

THE ORAL INJECTION OF LIPIODOL

AS AN AID TO THE DIFFERENTIAL DIAGNOSIS OF UPPER LOBE BRONCHIECTASIS AND PULMONARY TUBERCULOSIS.

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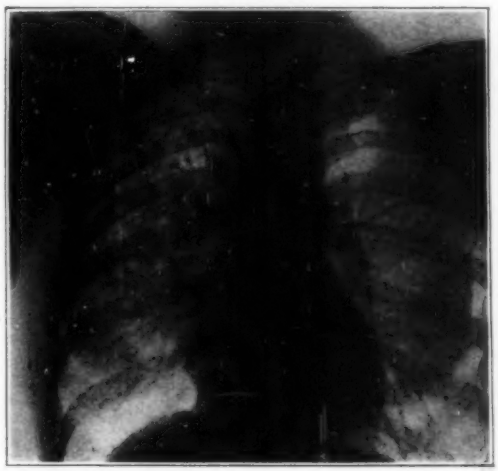
THE clinical picture in a case of well-marked basal bronchiectasis is usually clearly defined. The characteristic odour of the breath, the copious purulent sputum, the clubbed fingers, and the physical signs of consolidation and excavation make diagnosis easy. When, however, an upper lobe is the seat of the trouble the resemblance to the chronic fibroid type of pulmonary tuberculosis may be close, even when the disease has reached an advanced stage. In such a case the erect position ensures continuous drainage which is more effective than that obtained by occasional posturisation such as is practised by sufferers from basal disease. The sputum is less copious and may be inoffensive. There is less constitutional disturbance and there may be no clubbing of the fingers. The added sounds may have a dry quality compared with the bubbling râles due to accumulated secretion. Apart from the absence of tubercle bacilli in the sputum a diagnosis of pulmonary tuberculosis would seem justified. Difficulties in diagnosis are overcome by the use of lipiodol, and its administration by the oral route in suitable cases provides the easiest means of arriving at a correct solution.

FIG. 1.



Bronchiectasis of the right upper lobe before the injection of lipiodol.

A woman aged 28, a clerk, first visited the out-patient department at Victoria Park Hospital in 1921, complaining of cough. She attended for some months. There was a history of pneumonia in infancy and the case was regarded as one of pulmonary fibrosis. No tubercle bacilli were found in the spit. In 1924 she attended the tuberculosis dispensary attached to the hospital on account of chronic cough and blood-stained expectoration. The physical signs were consistent with a diagnosis of chronic phthisis; there was impairment of the percussion note over the upper half of the right side of the chest, and crepitations were heard in the same area. But the sputum was still negative for

tubercle bacilli, and though the case had been notified as tuberculous, Dr. H. T. Howell was not prepared to accept this diagnosis. She continued to attend the dispensary at intervals during the next six years owing to frequent re-notifications elsewhere. (T.B. 0, 1924 (4), 1925 (1), 1927 (1), 1930 (2)). Cough persisted but there was no deterioration in the patient's general condition, and the weight remained constant.

In February, 1930, the patient's panel doctor noted an apparent extension of the signs of disease in the right lung. On account of this she was sent to a general hospital where a skiagram was taken. The radiologist reported that there was evidence of chronic phthisis of both lungs and the patient was again referred to the dispensary. It was at this stage that Dr. Howell, who was not satisfied with this explanation of the condition, asked me to see the patient. The physical signs in the chest, noted above, had persisted while harsh breathing heard below the right clavicle indicated that there was probably cavitation in this region. A skiagram taken at Victoria Park showed numerous linear shadows radiating upwards to the level of the clavicle and outwards to the periphery. The appearances were those associated with extensive fibrosis of the right upper lobe. The lower half of the lung field showed no abnormality. In view of the history of the case, the physical signs and X rays, a tentative diagnosis of bronchiectasis of the right upper lobe was made (Fig. 1). After a preliminary test for iodine intolerance an injection of lipiodol was administered by the oral route on March 20th. A skiagram taken immediately after the injection showed that the whole of the right upper lobe was riddled with cavities, the bronchi of the lower lobe being normal (Fig. 2). A further skiagram taken in the erect position showing clearly defined fluid levels indicated the presence of some forty cavities. The picture was quite unlike that seen in fibroid phthisis and the diagnosis of bronchiectasis was thus confirmed (Fig. 3).

The injection of lipiodol by the oral route is seldom practised in this country, but in selected cases it is a method suitable for out-patient work, since it dispenses with the need for tracheal puncture and the injection of cocaine. A brief note on the technique of this method may therefore be of service.

FIG. 2.

After the injection: patient in the prone position.

The method is unlikely to succeed and should not be attempted when the patient is a child. A measure of intelligence and a willingness to coöperate on the part of the patient are also essential. Further, unless a clear view of the pharynx is obtained when the mouth is widely opened and the tongue extruded it is useless to inject by the oral route. In the absence of these contra-indications success may be expected in a considerable proportion of cases. If the method fails injection by the cricothyroid route is indicated, and for this admission to hospital, though not essential, is desirable.

The confidence of the patient having been gained, he is instructed to take hold of the tongue with a dental napkin and to draw it well forwards and slightly downwards, keeping the mouth as widely open as possible. In this posture deep breathing through the mouth must be practised several times a day for a few days preceding the injection. With a little practice the patient will overcome the initial discomfort of the position.

FIG. 3.

After the injection: patient erect.

For the injection the patient lies upon an operating table, supporting the head upon the right or left arm in such a way that the side of the chest to be injected is inferior, and leans upon the corresponding elbow. The attitude thus resembles that of a guest at a Roman banquet, and has been described by Dr. J. J. Singer as "the Cleopatra position." The foot of the table is now slightly lowered. A 20 c.cm. syringe fitted with a straight cannula 10 cm. in length and 2 mm. in diameter is filled with warm lipiodol. The proximal end of the cannula is steadied against the upper jaw of the patient, and the distal end projected into space between the tonsil and the uvula. It is obviously important to avoid touching the palate, pharyngeal wall, or tongue if retching is to be avoided. Injection of a few drops of oil is made during each inhalation with pauses during expiration. If this precaution is neglected oil will be blown into the mouth by the force of the expired air. Two or three minutes should suffice for the injection of 20 c.cm. If the injection is proceeding satisfactorily a slight gurgling sound will indicate that the oil is passing down the trachea. (A completely silent injection is evidence that the patient is swallowing the oil, a fact which may be verified later by X ray examination of the stomach.) Directly this has been accomplished the table is tilted head downwards to the full extent to ensure the flow of oil to the summit of the lung. The patient is then taken on a stretcher to the X ray department, remaining in a horizontal position till the first skiagram has been taken.

My acknowledgments are due to Dr. H. T. Howell, senior tuberculosis officer for Bethnal Green and Hackney, who kindly brought to my notice the patient whose case is described, and supplied notes on the past history.

A NEW TECHNIQUE COMBINING THE USE OF SURGERY AND RADIUM IN THE TREATMENT OF CANCER OF THE BREAST.

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THE objective aimed at in the radical treatment of cancer of the breast is the complete removal or destruction of the growth, however far it may have extended. The success of any procedure depends on its capacity for dealing with all-important paths of spread. These are grouped as follows:—

1. *Local growth*, spread along the tissue spaces and through the alveoli and ducts themselves.
2. *Lymphatic dissemination.* (*a*) Growth along lymphatic plexuses lying on fascial planes; (*b*) growth along lymphatic channels lying along vessels; (*c*) embolus along lymphatic ducts.
3. *Blood spread.* (*a*) After advanced lymphatic invasion; (*b*) early, after embolus following direct invasion of venous channels.

Complete cure can only be hoped for in those cases where lymphatic dissemination is limited. If blood spread has occurred, whether clinically recognisable or not, the growth is beyond cure by local treatment.

The procedures at present in use in dealing with carcinoma of the breast may be grouped as follows: (1) Surgery alone—extensive radical amputation. (2) Radium (or radon) alone, with needles, using Keynes's technique. (3) Radium and surgery. (4) Radium bomb.

The comparative claims of the first two procedures are those on which general attention is at present focused. In a well-planned surgical operation the local infiltration is removed and an attempt is made by wide excision of fascia to eradicate the growth that has spread by permeation. Lymphatic spread, however, can only be dealt with to the limited extent that a careful clearance of the axilla affords. With radium alone destruction of the local growth is not so certain, but a more definite attack is made on the line of spread into the supraclavicular triangle and into the anterior extremities of the upper intercostal spaces.

The results obtained by Sampson Handley in his recent cases[1] show an improvement on those of his previous series which, he suggests, may be due to the addition to his technique of inserting radium in the supraclavicular fossa and in the anterior extremity of the intercostal spaces.

The possible limits of the application of radium to the lymphatic spread have not yet been explored. Observations in the post-mortem room of advanced cases of cancer of the breast show that, where lymphatic spread has been slowly progressive, the upper intercostal spaces on the affected side, looked at from the pleural aspect, are frequently outlined by growth throughout their whole extent and the supraclavicular region is infiltrated by it. The growth could reach these intercostal spaces either through the anterior extremities or laterally, as in both these situations vessels and accompanying lymphatics perforate the external intercostal muscle. It is not as yet certain whether we are justified in regarding the spread along the intercostal spaces as occurring chiefly forwards or backwards, although it has been generally assumed that it occurs chiefly towards the spine.

Certain experiments made in the Bland-Sutton Institute with the Brown-Pearce tumour, which has both lymphatic and blood spread, may have some bearing on this question of direction of spread in the intercostal spaces. Inoculations of an emulsion of this tumour into the intercostal muscles of two rabbits have on each occasion shown little spread backwards but have produced growth in the anterior mediastinum massive enough to cause marked pressure effects. Further investigations are being made.

[1] Handley, W. S.: Surg., Gynecol., and Obst., 1927, xlv., 721.

In view of our limited knowledge of spread along this path the only safe course is to assume spread from both directions. The intercostal spread, therefore, has been dealt with by the insertion of radium needles between the intercostal muscles of the upper five or six spaces from the anterior extremity to a point posterior to the egress of lateral nerves. Only when a radical breast operation has been performed can radium be placed accurately between the intercostal muscles and in the desired situations in the axillary and supraclavicular spaces.

Investigations as to the immediate results of such a combined technique have been made, and this report is based on the results of a short series of unselected cases under my care during the six months from the middle of December, 1928, to the middle of June, 1929. Since that time, owing to the shortage of radium in the Middlesex Hospital through rearrangement of tubes, the work has been interrupted, but the cases have been reviewed within the last month for the purpose of this preliminary report.

FIG. 1.

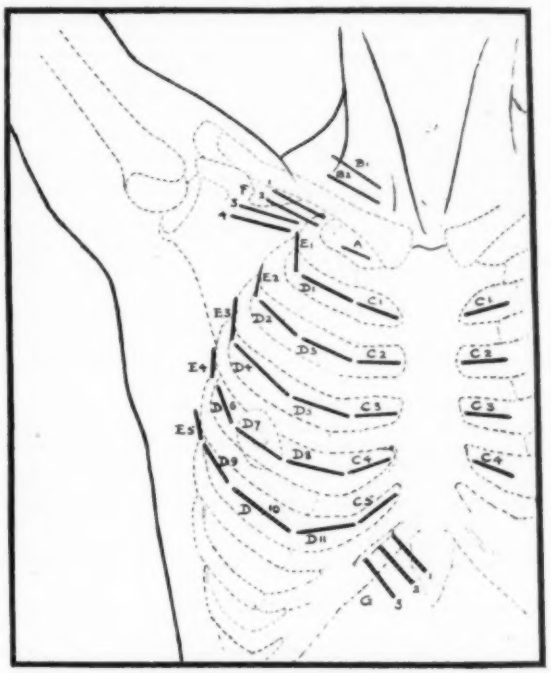


Diagram showing position of needles.

Technique of the Operation.

Operation, apart from the preliminary skin incision and dissection of the axilla, has been carried out with the diathermy knife. (It is essential that charring on the inner surface of the reflected skin flap be minimal, and if the diathermy is not working well it is better to resort to the scalpel.) In cases associated with ulceration and fungation the affected area is cauterised by diathermy before the reflection of skin flaps. If this cauterisation is carried out efficiently and the spread is not too extensive, the ordinary radical operation is performed but, if efficient cauterisation is impossible, if the growth is obviously too far advanced, or if marked sepsis is present, an extensive operation is contra-indicated and the operation and radium insertion are both modified.

A skin incision widely encircles the growth and skin flaps are reflected to the clavicle, the opposite side of the sternum, the epigastric angle, and posteriorly beyond the anterior border of the latissimus dorsi.

This is followed by removal of a wide area of fascia, including that covering the upper portion of the rectus and the clavicular part of the pectoralis major, the sternal head of the pectoralis major, and the pectoralis minor. Finally, the axillary glands are dissected out. The lateral thoracic nerve branches are left long at first as a guide to the insertion of the long posterior intercostal needles.

Radium is then inserted along the possible directions of spread beyond the limits of operation.

The following is the general distribution (Fig. 1), minor modifications being made according to the site of the tumour.

A. One 1·5 mg. (2 cm. long) needle above the first rib anterior to and below the axillary vein after clearing out the minute pocket in this situation.

B. Two 3 mg. (4 cm. long) needles above the clavicle. These are inserted through the skin of the supraclavicular triangle with a guiding finger in the axilla protecting the plexus and vessels.

C. Four or five 2·5 mg. (3 cm. long) needles on each side into the anterior extremity of the upper four or five intercostal spaces. On the side of the operation they are placed between the intercostal muscles, and on the opposite side they are inserted through the skin after closure of the wound.

D. Ten or twelve 3 mg. (4 or 6 cm. long) needles between the intercostal muscles of the upper spaces, covering the chest wall between the sternal needles and the points of exit of the lateral thoracic nerves.

E. Four or five 3 mg. (4 or 6 cm. long) needles directed posteriorly between the intercostal muscles in the upper spaces from the points of exit of the lateral cutaneous nerves. In the first space a shorter needle may be used.

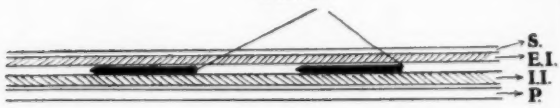
F. Four 3 mg. (4 cm. long) needles in the axilla, two anterior to the plexus, stitched to the posterior surface of the clavicular head of the pectoralis major with fine plain catgut and two behind the plexus, stitched to fascia over the subscapularis.

G. Two or three 3 mg. (4 cm. long) needles are stitched in the epigastric angle.

With C., D., and E the needle point must be seen to be raising the thin external intercostal muscle while it is being inserted beneath it.

The threads attached to the needle are drawn through the line of skin suture or through special stab holes made with a tenotomy knife. This insertion of radium adds 15 to 20 minutes to the time of a radical operation. The needles are removed a week later under gas and oxygen anæsthesia. Obviously care must be taken that the exit holes through the skin are so placed that the taut thread from the needle to them continues the direction of the needle.

FIG. 2.



A. B.

Diagram of section of chest wall to show position of radium needles. S. = skin. E.I. and I.I. = internal and external intercostal muscles. P. = pleura.

Thread direction as in A will ensure easy removal and allow for slight displacement. With thread direction as in B the needle will be tilted during withdrawal with risk of damage to the underlying pleura. No force should be used in withdrawing the needle. If the slightest resistance is experienced a small stab through the skin on to the butt-end of the needle ensures safe removal.

The Case Reports.

The series consists of two groups: *Group A* comprises seven cases with full technique—i.e., complete radical amputation and full use of radium. Most of them showed very little reaction. Two or three developed diffuse erythema with an œdematous condition of the skin over the area of treatment. Three cases developed pain over the distribution of the inner cord of the brachial plexus. This pain remained for some months. These cases are at present all well and apparently free from recurrence at the end of a period of from 7 to 13 months. *Group B* comprises three cases treated with modified technique, limited amputation, and modified use of radium. Two of these were advanced and ulcerated cases. One died as a result of sepsis following operation and one from distant metastases six months later with no signs of growth near the operation site.

The following are brief notes of the cases in the two groups:—

Group A.—1. Aged 60. Duration nine months. Rounded growth, 1½ in. in diameter in region of nipple with some puckering of skin. Firm lymph glands <½ in. Moderate malignancy.[1] Breast showed cancer histologically but glands nil. Operation December, 1928. Present condition (February, 1930): no symptoms and no evidence of recurrence.

2. Aged 69. Duration over a year. Rounded growth 1½ in. in diameter in region of nipple. Attached to skin (much puckering) and to underlying muscle. Lymph glands firm >½ in. Low malignancy. Breast +, glands +. Operation, December, 1928. Present condition: no symptoms, no evidence of recurrence.

3. Aged 45. Abscess in breast 1914. Lumpy near site of old abscess for six week. Rounded growth 1½ in. in diameter, situated near nipple, upper and inner quadrant. Attached to skin and causing elevation of nipple. Glands >½ in. High malignancy. Breast +, glands +. Operation February, 1929. Present condition: no symptoms, no evidence of recurrence.

4. Aged 41. Duration over 12 months. Complained of pain in arm and shoulder. Growth axillary tail 1½ in. in diameter adherent to skin. Glands >½ in. firm. Moderate malignancy. Breast +, glands +. Operation April, 1929. Present condition: occasional slight pains in side and shoulder. No evidence of recurrence.

5. Aged 41. Duration: lump four months. Large growth 2 in. in diameter, axillary quadrant attached to skin and underlying fascia. Glands >½ in. Moderate malignancy. Breast +, glands +. Operation May, 1929. Present condition: no symptoms, no evidence of recurrence.

6. Aged 37. Duration: lump three years, rapid growth three months. Large mass in axillary quadrant, 2½ in. in diameter. Wide skin involvement. Glands >1 in. Moderate malignancy. Breast +, glands +. Operation June, 1929. Present condition: no symptoms, no evidence of recurrence.

7. Aged 37. Large lump in outer and lower quadrant, attached to skin. Glands felt in axilla. Typical cancer on incision after operation. No pathological report on this specimen. Operation June, 1929. Present condition: occasional pain in wound and down inner side of arm. No evidence of recurrence.

Group B.—1. Aged 66. Duration 6 years. Nine months ulceration and discharge. Large irregular growth 3½ in. in diameter, replacing breast and extending through muscle. Glands >½ in. High histological malignancy. Breast +, glands +. Operation December, 1928. Breast and pectorals removed, largest glands dissected from axilla. Edges of skin stitched to deep structures. Limited use of radium. Death from general toxæmia 21 days after operation.

2. Aged 46. Duration 3 months, 1 month ulceration and fungation. Enormous fungating mass replacing the left breast, 4in. in diameter, fixed to muscle with hard glands >1in. in axilla. Low malignancy. Breast +, glands +. Modified operation April, 1929. Edges of skin stitched to fascia, limited use of radium (16 needles). Returned in September, 1929, complaining of pain in back, right hip, and leg. Secondary deposits in vertebræ and pelvis shown by X rays. No local recurrence. Death in October following paraplegia associated with pain in dorsal region.

3. Aged 49. Duration 18 months. Lump ¾ in. in diameter in lower and inner quadrant near periphery. Attached to skin and deep fascia. No glandular involvement. Moderate malignancy. Breast +, glands not found. Operation June, 1929, limited because of collapse of patient while skin flaps were being reflected. Thirty needles of radium. Present condition: no symptoms, no evidence of recurrence.

Note.—The figures indicating size refer to measurements of actual growth and of glands by the pathological department after incision.

Conclusion.

The series is small and the survival interval too short to allow any comparison of the efficiency of this with that of any other method of treatment of cancer of the breast. The results are presented for consideration because they appear to establish the possibility of a more extensive attack on local and lymphatic spread by the combined use of surgery and radium than can be achieved by either alone.

[1] Patey, D. H., and Scarff, R. W.: The Position of Histology in the Prognosis of Carcinoma of the Breast, THE LANCET, 1928, i., 801.

IMMUNISATION OF THE MALTESE GOAT BY MEANS OF CUTANEOUS VACCINATION.

BY SIR THEMISTOKLES ZAMMIT, C.M.G., M.D.,

AND

J. E. DEBONO, M.D.

(*From the Public Health Department, Valetta.*)

IN December, 1928, an informal report was presented to the head of the Government by one of us (T. Z.) upon the continued and prevalent use of unboiled milk in Malta. In face of the widespread *Micrococcus melitensis* infection amongst the milch animals and the absence of administrative measures aimed at preventing the distribution of unsterilised milk, this report suggested that further methods must be sought for preventing the infection of milch animals, since none of the customary means of prophylactic vaccination had yielded practical results. It further pointed out that *M. melitensis* infection was readily produced through the damaged skin, and there was much evidence to show that milch animals, particularly goats, were commonly infected by this route, especially through the tender skin of the udders. Owing to their immoderate size, these organs are especially liable to become scratched and to come in contact with the urine of the infected animals. Hard fodder, accidentally impregnated with infective material, is probably another source of infection by wounding the mucous membrane of the mouth. Indeed, it is probable that when infected milk is consumed the actual site of infection is the buccal cavity itself and not the intestinal tract.

In view of these facts, Besredka's method of local cuti-immunisation might logically be expected to prove of value, and it was suggested that investigations in this direction would be useful. The suggestion was approved by the Government, and the Legislative Assembly voted the sum of £250 to defray the cost of preliminary experiments. The following is a summary of the work already carried out.

In planning our experiments our first object was to ascertain what measure of protection could be conferred on goats by simple dermal vaccination, and incidentally to ascertain whether *B. abortus* Bang could be substituted for *M. melitensis* in the preparation of the antigen, for the cultures of the latter organism are more dangerous to handle.

First Series of Experiments.

The antigen first used was prepared as follows:—

Nutrient broth (+8 Eyre's scale) was inoculated with a newly isolated culture of *M. melitensis* obtained from the Public Health Department and incubated at 37° C. for twenty-four days. At the end of this time the reaction of the broth had undergone a change to +2, and it became turbid owing to the luxuriant growth of the organism. It was then filtered through a Chamberland filter candle and the sterility of the filtrate proved by the absence of growth on agar subcultures. The same *melitensis* strain, when reinoculated into the filtrate, failed to develop. The antigen was completed by the addition of tricresol in a concentration of 0·5 per cent. Goats were exclusively employed in our experiments. They were kept in a cool, clean, and airy place; they were well fed and the rectal temperature was taken daily at 5 P.M.

Seven goats were employed in this series. On preliminary examination three of the animals gave a positive serum reaction. This was unfortunate, for it showed that the goats had been drawn from a tainted herd, and possibly the other goats, despite a negative serum reaction, might be in an initial stage of the infection. These three infected goats were at once replaced, but owing to pressure of time the new goats could not be kept under observation for more than a week, and later events made it probable that one of the fresh animals was incubating the disease during the experimental period.

Of the seven goats, one was retained as a control; the remaining six were each treated as follows:—

The belly was washed with soap and water and the base of the udder shaved with a safety razor. About 10 c.cm. of the filtrate were sprayed over the mammary area and into the mouth by means of an atomiser. One c.cm. was also injected intradermally in four places at the base of the udder.

The treatment was repeated five times on alternate days. The blood-serum of all the goats was repeatedly examined for specific agglutinins, but none was observed except in one of the new goats, No. 6, referred to above, which gave a reaction of 1 in 160. It is improbable that this reaction was due to the treatment, since it was absent in the other goats, and we have every reason to suspect that it was due to an infection acquired before the goat came into our possession.

Two days after the last treatment all the goats, including the control, were inoculated subcutaneously with 1 c.cm. of an emulsion of living (virulent) *M. melitensis* (approximately 3000 millions). The milk of all the animals was plated every four days, and a specimen of blood was taken for hæmoculture every week. No untoward symptoms were noticed until the fourth day, when there was a sharp rise of temperature to 105° F. in the control. This persisted for three days, and then came down gradually. Eight days after inoculation the serum reaction of all goats became positive in dilutions varying between 1/80 and 1/160, but in the control it went up to 1/320. On the eighth day the organism was recovered in great abundance from the milk of the control, and persisted until the milk dried up completely four weeks after infection. In spite of repeated attempts, *M. melitensis* could not be obtained from the milk of the other goats, except once from No. 6, which, as already explained, was under considerable suspicion. Hæmocultures were negative except in the case of goat No. 3, which proved positive four weeks after infection.

Six weeks after infection all the goats were killed and a complete post-mortem examination was carried out. No gross pathological changes were observed. Portions of the spleen, kidney, and liver, and of the mammary, inguinal, and mesenteric glands were removed and plated on liver-infusion-gentian-violet agar. The plates were kept under observation for 15 days and suspicious colonies were subcultured and examined both microscopically and by the agglutination test. The results are shown in Table I.

TABLE I.

Goat.	Liver.	Mes. gland.	Spleen.	Kidney.	Mamma.	Ing. gland.
1	—	—	—	—	—	—
2	—	—	—	—	—	4 cols.
3	—	—	—	—	—	3 cols.
4	—	—	—	—	—	—
5	—	—	—	2 cols.	—	—
6	+	—	+	+	+	—
Control ..	—	—	+	—	+ + +	+ + +

Result.—Two animals successfully resisted infection; in three others the infection was light.

Note.—The numbers refer to the number of colonies identified; + means infection. Goat No. 6 we consider was already infected when bought.

Second Series.

The same technique was followed but a different antigen was employed.

The broth culture was not filtered, but devitalised by the addition of tricresol and used without further preparation. This series comprised five goats, one being reserved as a control. After the five treatments, the blood-sera of each of the vaccinated goats gave a positive reaction thus: No. 8, 1 in 320; No. 9, 1 in 640; No. 10, 1 in 640; No. 11, 1 in 1280; control, nil. The reactions in this case were obviously due to the intradermal injection of the bodies of the dead or devitalised microbes.

Two days after the last treatment (twelve days after the first) all five goats were infected by rubbing an emulsion of living *melitensis* over a slightly scarified area of skin measuring about a square inch. Again no signs of infection were noticed, even in the control.

As the goats were not milking, the milk could not be tested. The serum reaction remained unaltered in titre in the vaccinated animals, but the control invariably gave a negative result. Hæmocultures were attempted every week, but with negative results. Owing to the non-appearance of the serum reaction in the control we waited eight weeks before destroying the animals. Eventually they were killed and the usual organs were plated as in the previous experiment, with the result given in Table II.

TABLE II.

Goat.	Liver.	Mes. gland.	Spleen.	Kidney.	Mamma.	Ing. gland.
8	—	—	—	—	—	+
9	—	—	—	—	—	—
10	—	—	—	—	—	+
11	—	+	+	—	—	—
Control ..	—	++	—	+	+++	+++

Result.—One animal successfully resisted infection.

Third Series.

The antigen was again varied and this time a sterilised unfiltered broth culture of *B. abortus* was employed. This strain was kindly furnished by Dr. Weigmann, of Copenhagen, through the good offices of Prof. Maurizio Ascoli, of Catania. The third series comprised only three goats, of which one was retained as a control. The treatment was the same as in the second experiment, and the *melitensis* infection was induced by scarification. After the treatment no symptoms of any sort were noticed, and the temperature remained normal throughout. The agglutination reactions stood at 1 in 540 and 1 in 1280 respectively. Hæmoculture was negative in all the cases and the control showed a negative serum reaction up to six weeks after infection. Six weeks after infection the goats were killed and the results shown in Table III. were noted on post-mortem examination.

TABLE III.

Goat.	Liver.	Mes. gland.	Spleen.	Kidney.	Mamma.	Ing. gland.
1	—	—	+	—	+	+
2	—	—	—	—	—	—
Control ..	—	—	+	—	+	+++

Result.—One goat successfully resisted infection.

Results.

Subsidiary to the main question but of fundamental importance is the observation that the serum reaction remained persistently negative in two of the controls, in spite of a very heavy infection revealed post mortem. Hitherto the existence of the serum reaction has been considered as an index of infection and its absence the proof of normality, but our observations throw considerable doubt on its reliability when used as a test for the detection of infected animals. This point is sufficiently important to demand fuller investigation.

Reviewing our results as a whole, it is clear that we have not achieved complete and effective immunity, and at the same time it is evident that we conferred a certain measure of protection in what is normally a very susceptible animal. If we disregard goat No. 6, on the grounds of natural infection before purchase, we can say that: (1) *B. melitensis* was not found in the mammæ or in the milk of any of the treated goats, while it was present in the milk of the first control and in the mammæ of the other two. (2) In four out of twelve treated goats there was no sign of infection. (3) In the remaining eight the infection was mild as compared with that of the controls, in that only a few colonies of *melitensis* were obtained, whereas most of the plates made from the controls were crowded. (4) *B. abortus* employed as antigen appears to be as effective as *B. melitensis*.

We believe that, with certain modifications in technique, cutaneous vaccination can be rendered more effective and that we have obtained enough prima facie evidence to justify a continuation of our experiments, which are only preliminary.

Clinical and Laboratory Notes.

TWO YEARS' EXPERIENCE OF THE KAHN REACTION.

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WHEN in 1927 it became obvious, from the increasing number of reports appearing, that the Kahn reaction for the diagnosis of syphilis was gaining ground, it was decided to try the method at this hospital. For a few months a preliminary test was done, and as the results were favourable it was decided to employ the reaction as a routine on all sera sent for Wassermann. Kahn's technique has been followed as closely as possible, while the Wassermanns have been done by C. H. Browning's method which has given very consistent results when checked against the results obtained at another laboratory using a method recognised by the Ministry of Health, where most of our Wassermann tests are duplicated. The results given here do not include tests done in the preliminary trial of the method.

In the period covered, 3823 sera have been tested by both methods, and Table I. shows the degree of agreement reached.

TABLE I.

—	Absolute agreement.	Relative agreement.	Absolute disagreement.
Total and percentage	3534 (92·42)	146 (3·83)	143 (3·74)

Table II. shows what has been taken as absolute and relative agreement.

TABLE II.

—	Absolute agreement.				Relative agreement.				Absolute disagreement.					
Wassermann	+ +	+	+ −	−	+ +	+	+ −	−	+ +	+	+ −	−		
Kahn ..	+ + +	+ +	+	−	+ +	+ + +	−	+ −	+	or	−	+ + +	or	+ −

The figure for absolute disagreement is very close to that reported by other workers, but further considerations allow of improvement even on this. Among the 143 sera showing absolute disagreement are 51 "repeats." Removing these from the Table—i.e., considering only results of single tests on single

TABLE III.

—	—	Absolute agreement.	Relative agreement.	Absolute disagreement.
Antenatal cases.	Total and percentage	780 (96·3)	16 (2·0)	14 (1·7)
New-born infants.	Total and percentage	591 (98·5)	3 (0·5)	6 (1·0)

patients—the absolute disagreement is only 2·43 per cent. Removal of the treated cases would still further lower this figure. It is our experience that

the Kahn test remains positive after the Wassermann has become negative in a large number of cases. The actual degree of disagreement between the two methods is probably best shown by Table III., which gives the figures for the antenatal clinic and new-born infants.

Here we are dealing with 1400 sera taken as a routine, without selection and without any clinical suggestion of syphilis.

When the agreement between the tests is relative, we have found the Kahn to be stronger in 60 per cent. of cases, but in those entirely disagreeing the Kahn is stronger in 95 per cent. of tests. This agrees with the finding that in treated cases the Kahn remains positive longer than the Wassermann. It is difficult to make a complete analysis of all the tests which disagreed and to correlate them with the clinical findings, but we have definitely found the Kahn of great value in such cases as the following:—

CASE 1.—A male, aged 24 years, was seen with a primary sore. *Spirochæta pallida* was identified in the smears. The Wassermann was negative, but the Kahn strong positive. The Wassermann has never been positive; the Kahn is now negative after treatment.

CASE 2.—A new-born infant. Blood from the cord gave a negative Wassermann and a strongly positive Kahn. The mother's blood gave a positive Wassermann and a strongly positive Kahn.

CASE 3.—A female, aged 53, was admitted with a diagnosis of tabes dorsalis. The blood—Wassermann was suspicious and the Kahn a strong positive. The cerebro-spinal fluid gave a strongly positive Wassermann.

The Kahn test has now taken its place among our routine examinations and is done on all sera sent for Wassermann. It does not take long to do, and, though it requires care and practice in reading the results, its value has been proved. There is no intention of replacing the Wassermann, but the Kahn is definitely considered a useful addition to the older test.

A FATAL CASE OF DIPHTHERIA WITH CEREBRAL THROMBOSIS.

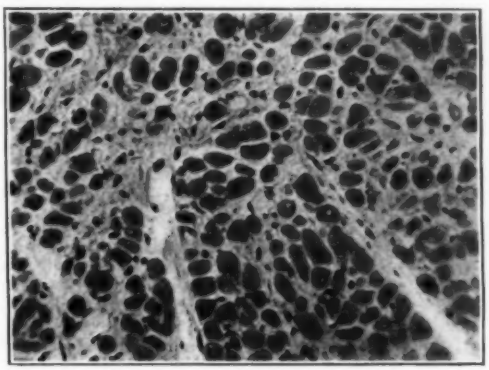
BY J. B. ELLISON, M.B. CAMB., D.P.H.,
ASSISTANT MEDICAL OFFICER, GROVE HOSPITAL, TOOTING.

ALTHOUGH toxin is damaging to the whole vascular system, intracerebral catastrophes appear to be very rare during the course of clinical diphtheria. J. D. Rolleston (1916) has published 96 cases from the world's literature, with an account of 18 post-mortem examinations, but I am unable to discover any record of such a case since 1916. The 18 recorded necropsies revealed cerebral embolism 13 times, cerebral thrombosis three times, hæmorrhage once, and "sclerotic atrophy" once. Owing to the unusual character of the clinical and pathological findings, the following case appears worthy of record, although a satisfactory explanation of the disaster is wanting.

On Nov. 23rd, 1929, a boy aged 6½ was admitted to the Grove Hospital suffering from severe faucial diphtheria. There was a previous history of measles, whooping-cough, and chicken-pox. On admission a thick membrane was observed covering the tonsils and the pillars of the fauces, with a slight extension on to the soft palate, and there was some œdema of the neck. The first sound of the heart was softened at the apex and the pulse-rate was 132. The child had apparently been ailing for about two days before admission. An intramuscular injection of 32,000 units of antitoxin was given. Next day the membrane showed signs of separating, but a further injection of 24,000 units of antitoxin was given subcutaneously. The heart was not dilated and the pulse was of good volume, with a steady rate of 110. Two days later the membrane had completely separated and the patient appeared to be making very good progress.

On Dec. 1st he vomited and the pulse became irregular (ninth day since admission). Adrenalin ℿv. four-hourly was ordered, and the foot of the bed was raised. Next day the pulse had improved in volume and steadiness, the heart sounds were normal, and there was no further vomiting, but on the following day, although the pulse showed further improvement, early paralysis of the palate was detected. The first sound of the heart was softened and slightly prolonged at the apex. At 8 P.M. on Dec. 5th the nurse in charge reported that the patient had suffered a "convulsion," with moaning and grinding of the teeth, lasting about five minutes, after which he appeared to be paralysed on the right side. When seen at 8.10 P.M. flaccid paralysis of the right arm, leg, and right side of the face was noted. The patient was conscious; he could swallow and protrude the tongue, but was unable to speak. The limb jerks and abdominal reflexes were absent on the right side, and a right extensor plantar response was elicited. The inability to speak was apparently the result of total motor aphasia which made it difficult to decide whether there was any loss of sensation on the affected side. The pupils were equal and reacted to light and accommodation. There was no nuchal rigidity. The pulse remained steady at a rate of 80 and was regular.

On Dec. 6th spasticity of the right arm was present and the knee-jerk had returned on the right side. Complete aphasia was still present. A diagnostic lumbar puncture was performed, revealing a fluid of normal composition with one cell per cubic millimetre. The pulse remained steady and of good volume. On Dec. 8th increasing spasticity of the right arm and leg was observed, while the facial weakness



Section of myocardium.

was much less obvious. The patient appeared to be in pain but was unable to articulate any word. At 9 P.M. he was reported to have had another "convulsion" lasting a few minutes, accompanied by moaning and grinding of the teeth. When seen a few minutes later he was unconscious with conjugate deviation of head and eyes to the right. The pupils were equal and widely dilated, but reacted to light. Cheyne-Stokes respiration was noted. Physical examination revealed spasticity of the left arm and leg with brisk knee and ankle-jerks, and patellar clonus. There was now a double extensor response. The optic discs were injected and the retinal vessels appeared to be dilated. The patient became gradually weaker and died at 12.20 A.M., without regaining consciousness. The pulse remained of good volume until near the end.

Post-mortem Examination.

The body was that of a normally developed boy of about 6 years. The brain was uniformly softened (examined four days after death). The convolutions were not flattened, and there was no excess of cerebro-spinal fluid. Examination of the circle of Willis revealed thrombi completely occluding the main trunks of both middle cerebral arteries. On each side the thrombosis appeared to have begun at the first bifurcation and to have extended peripherally into all the smaller branches. The thrombus on the left side appeared older than that on the right and showed early organisation. Macroscopically the cerebral arteries appeared quite healthy and were well developed.

A microscopic section of the thrombosed vessels showed, on the left side, a thrombus about two days old in which polymorphonuclear leucocytes could be seen breaking down hæmoglobin. The right artery showed thrombosis of very recent origin, probably only a few hours. There was no evidence of any disease or malformation of the vessel walls. The brain showed softening of the white matter, atrophy of nerve-cells, and numerous capillary thromboses. The meninges were healthy. (The site of the thromboses is shown in the Figure.

Heart.—The heart was flabby and dilated, but the valves and mural endocardium appeared perfectly healthy. The condition of the myocardium was especially interesting because there seems little doubt that, but for the vascular crises, the patient would have recovered completely.

Clinically his heart appeared to be improving steadily from the tenth to the fifteenth day. Microscopic section revealed marked toxic changes in the muscle-fibres; they were separated from one another and irregular in outline. The protoplasm was granular and vacuolated, while in many fibres the nuclei had completely disappeared and in others they stained but faintly and were in course of disintegration, in others again being considerably diminished in size. There was no increase in connective tissue. (See Figure.) The aorta and pulmonary arteries were quite healthy.

The remaining organs showed the usual toxic changes associated with acute diphtheria.

No cause for the thrombosis can be suggested; the condition was definitely not produced by emboli. The patient had no reaction after the injections of antitoxin, but thrombosis can scarcely be regarded as an anaphylactic phenomenon. Perhaps it is worth while to mention that two of the patient's grand-parents were stated to have died of "apoplexy." The parents are living and healthy.

As in all other recorded cases, there was a severe infection of the myocardium and a large amount of membrane on the fauces.

I am indebted to Dr. J. H. Whitaker, medical superintendent of the Grove Hospital, for permission to publish the notes on this case.

A CASE OF ACUTE SYPHILITIC MENINGITIS.

BY N. KRAMER, M.R.C.S. ENG.,
HOUSE PHYSICIAN, ST. JOHN'S HOSPITAL, LEWISHAM.

A MAN, aged 24, presented himself at St. John's Hospital on July 6th, 1929, with a chancre on the prepuce, stated to have been there 14 days. The *Treponema pallidum* was demonstrated by the dark field.

Treatment was begun at once, beginning with a course of mercury pills followed by neokharsivan. After the fifth injection on Sept. 13th the patient gave up attending. Five weeks later he developed severe headache and giddiness and this continued for a fortnight.

On Oct. 29th he was admitted to St. Thomas's Hospital. The following account is taken from the notes kindly forwarded from there. On examination there was slight bilateral papilloedema and paralysis of the left seventh and eighth nerves. The blood Wassermann was positive (+ +). The cerebro-spinal fluid contained 1500 cells per c.mm., and 98 per cent. of them were lymphocytes. There was a gross excess of globulin. The cerebro-spinal Wassermann was very strongly positive (+ + + +). Treatment was by a course of 12 mercury inunctions, six injections of 0·3 g. of novarsenobenzol, and one injection of stabilarsan. He was discharged on Nov. 21st, 1929, feeling quite well, and showing no abnormal physical signs.

On Nov. 26th he attended the clinic at St. John's Hospital. He was treated by a course of mercury pills and potassium iodide. The blood Wassermann on Nov. 26th was + +, and the Vernes 79. On Jan. 14th the blood Wassermann was + + and the Vernes 39. Very soon after this he developed severe headache, giddiness, and diplopia. On Jan. 30th he was admitted to St. John's Hospital. He was semi-comatose, was delirious at times, and showed marked hyperæsthesia. All reflexes were very brisk, and the plantar responses were flexor. The pupils showed no abnormality and the discs were normal. Of the cranial nerves only the right facial was affected. The cerebro-spinal fluid was under pressure and slightly turbid and contained 790 cells per c.mm.; the majority were lymphocytes. There was a gross excess of globulin. The cerebro-spinal fluid Vernes was 94·5. The patient was treated by one injection of 0·3 g. of neokharsivan, followed by a course of intramuscular injections of mercury cyanide 1 c.cm. (½ g.) twice weekly for eight injections. This was followed by three injections of bismogenol: 0·5 c.cm., 1 c.cm., 1·5 c.cm., at intervals of four days.

Shortly after admission the patient's condition greatly improved and four days later he was quite well and showed no abnormal physical signs. He was discharged five weeks later on March 11th. The cerebro-spinal fluid then was clear and contained 80 cells per c.mm., most of them being lymphocytes. The cerebro-spinal fluid and blood Wassermann was + +.

The case presents some very unusual features. In spite of the fact that treatment was started as soon as the chancre was found, meningitis developed after four months, and again, although treatment was continued uninterruptedly, a second attack of meningitis occurred within three months of the first one. At the time of writing the patient is quite well and carrying on his occupation.

I am indebted to Dr. H. M. M. Woodward for permission to publish these notes.

Medical Societies.

POOR-LAW MEDICAL OFFICERS' ASSOCIATION.

THE annual general meeting of this Association, the last meeting under its old name, was held at the Holborn Restaurant on June 12th, with Sir ARTHUR NEWSHOLME, the President, in the chair. Prof. MAJOR GREENWOOD opened a discussion on

POST-GRADUATE EDUCATION FOR THE LOCAL GOVERNMENT MEDICAL SERVICE.

Medical education, he said, was of two totally different kinds. The first was education in the pure sense, such as Macaulay had in mind when he said that if Cherokee were taught instead of Greek in our universities the students who wrote the best Cherokee verses and understood the use of Cherokee particles best would be the best men. The second was education in the sense of technical instruction, to secure that the tyro should learn how to perform certain skilled manipulations in the best possible way. A century ago medical education in the hospitals had been almost entirely technical. The idea of general scientific education had been in its early stages about 50 years ago, and 30 years ago the transition had become complete, physiology and anatomy being taught by pure specialists. Post-graduate education had been represented by the Diploma of Public Health, which conferred a definite legal status, and the Fellowship of the Royal College of Surgeons and the Membership of the Royal College of Physicians, which in practice had the same effect. These two latter qualifications showed clearly the mixture of the two notions of education. For the Membership of the Royal College of Physicians candidates were examined in the classical languages; the examination had been somewhat perfunctory, and it had been discontinued as a compulsory test six years ago; the conception nevertheless had been that a certain breadth of culture was desirable in a physician. The Royal College of Surgeons had maintained that point of view even more strongly; the teaching and examination in physiology, for example, were supposed to have had a definite cultural value, lectures having been given on parts of the physiology of the special sense organs and similar subjects of remote technical but considerable cultural value.

It was interesting, said Prof. Greenwood, to examine the attitude of the authorities to the youngest of these special diplomas, the Diploma of Public Health. The first rules issued by the General Medical Council in 1896 had begun by stating that the possession of a distinctly high proficiency, scientific and practical, in all the branches of study which concerned the public health should be a requisite of any diploma that the Council would register. According to the German proverb, however, "*Es wird nicht so heiss gegessen als es gekocht ist*," and the practical embodiment of that high principle of the General Medical Council was the requirement of six months' practical instruction in a laboratory or laboratories in which were taught chemistry, bacteriology, and the pathology of the diseases of animals transmissible to man. The requirements for instruction in the duties of a

medical officer of health left very considerable latitude to the examining and teaching bodies; it was mainly valuable on the technical side. The general scientific value of the teaching in bacteriology and chemistry was altogether subordinate, and the public health students were often not regarded with very serious interest by the teachers of these subjects. Thirty years ago, therefore, the course prescribed by the Council had been largely a matter of indifference, and the men who had entered the public health services had been men who had seen a vision, who had wished to pursue a certain ideal; men like Power, Shirley Murphy, and the President of this Association. The material rewards had been so trivial that only a real enthusiast would enter the service. It was no stigma on the younger generation to say that its average level was lower than that of 30 years ago. Owing to the splendid success of the work of those men the public health service had been enormously extended, and now offered a career for a large number of young medical men.

Increase in Technical Training.

In 1922 the General Medical Council had promulgated a new series of rules which had had roughly the effect of making the attainment of a diploma in public health considerably more difficult. The rules of 1896 had merely required that 12 months should elapse since qualification. The new requirements laid down that:—

"A period of not less than two years shall elapse between the attainment by a candidate of a registrable qualification in Medicine, Surgery, and Midwifery and his admission to the Final Examination for a Diploma or Degree in Sanitary Science, Public Health or State Medicine."

The Council had explained its reasons—perhaps a fault in legislators—for this legislation:—

"The purpose . . . . is to provide opportunity for candidates for the Diploma or Degree in Sanitary Science, Public Health, or State Medicine to pass from the state of pupilage to that of responsible practitioners, to give mature consideration to the obligations and duties involved in the work of the public health service, and to acquire direct experience of medical work in a responsible capacity either in practice or in hospital or laboratory appointments. The Council believe that, in the public interest, the time has arrived to adapt the diploma or degree to candidates who are seriously intending to take up public health work as a career."

The Council had next set down in much greater detail than before the subjects which they considered should be studied by candidates for the Diploma in Public Health. In the old days a complete ignorance of, for example, vital statistics would never have deprived a candidate in this country of a single mark. The latest orders of the Council, besides repeating the old requirements in bacteriology, chemistry and physics, laid down the minimum number of hours which should be devoted to these subjects. It required a minimum of 180 hours' study of bacteriology and parasitology, not less than 150 hours being occupied in practical laboratory work; it prescribed a minimum of 90 hours' work in chemistry and physics, and of 10 hours in meteorology and climatology in relation to public health. Epidemiology and vital statistics must be allotted at least 20 hours, and sanitary law and administration another 20 hours. Provision had been made in London for the teaching of students in the new School of Hygiene and Tropical Medicine, which had been equipped at great expense and had a full-time staff.

Practical Difficulties.

The problem was how far it was possible to turn out students who were really better trained than their fathers or grandfathers had been. The first difficulty was the mixture in medical education of technical and general training. A specialist criticising this schema would say that it was utterly impossible to turn out highly trained technicians in the time allotted to each technical subject. The time was too long for a more popular introduction to the subject and too short to produce real technical skill. The practical difficulty encountered by the teacher of public health students was that the whole point of view of undergraduate medical training was necessarily and rightly utterly different from the point of view of an epidemiologist. The clinician was concerned with relieving and curing the sickness of individuals; the epidemiologist with disease as a mass phenomenon. It was enormously difficult in dealing with young medical graduates to prevent them from either adopting dogma or from passing over into a state of ignorant scepticism. The young medical graduate had had a large amount of technical education, but when presented with a general argument was often as helpless as a child. In public health work the most certainly ascertained results were based on a balance of probability. A conclusion with respect to the importance of contamination of water-supplies in the history of typhoid that anybody considering the evidence as a whole would accept, was never based on a conclusive proof in the sense of a crucial experiment. Sometimes the balance hung still more doubtfully, and it was of the utmost importance that the young graduate who was going in for public health work should acquire some skill in the weighing of probabilities. The amount of time at the disposal of teachers was so short and the technical requirements so great that there was a real danger that a university school might degenerate into a mere institution for cramming students with selected wads of technical information. There was one safeguard: that the student was examined by his own teachers on the teaching actually given in the school, but the teaching had to conform to the rules of the General Medical Council. Some parts of the curriculum were given much more time than the minimum. So long, however, as students were stretched out on this procrustean bed there was a danger of producing young men with merely a certain smattering of technical knowledge. Prof. Greenwood submitted that there was a certain amount of English hypocrisy about the system—a pretence that things were different from what they really were—and he suggested that the pretence that it was possible to turn out highly trained technicians after even a year's course was a little dangerous. He asked whether it might not be better to admit frankly that parts of the course, so far as they had a value, were valuable in the general educational sense. The students who could acquire the scientific spirit from a course of epidemiology and vital statistics were probably going to be mere breakers of apparatus in a bacteriological laboratory. On the other hand, some men to whom statistics and the doctrine of Hippocrates were mere sound and fury might obtain a glimpse of the spirit of science in a laboratory. It would probably be better, he suggested, to pitch a very low general minimum of technical requirement; and then give students a choice of the subjects on which they must spend extra time, and to require a higher standard of those subjects.

The tendency to increase technical instruction in post-graduate and undergraduate medical education might be a necessary evil, but it was a great one. Prof. Greenwood suggested that the physiology taught 30 years ago had had greater educational value than that taught to-day; the increase of knowledge and the complication of method was so great that it would be impossible, even if the teacher had far more time, to make the student understand the general principles of the investigations which now led to results. He suggested, first, that young graduates were less educated than their predecessors of 30 years ago, although they had more knowledge, and, secondly, that the higher level of general culture on which the Royal Colleges had insisted was really required in men who were going to give their lives to the public health service. The prizes of the public health service could not compare with those of the clinical side of the profession, and the type of students likely to be attracted was composed of men who, if they had been laymen, would have tried to enter the Civil Service—who wanted something

safe. A great many men of the highest type with a real vocation would undoubtedly join the service, but it would not attract the pick of the ambitious undergraduates. Teachers had to try to repair the deficiencies in their students' education, and the very overburdened technical course might make this task somewhat difficult.

Discussion.

The PRESIDENT thought that Prof. Greenwood was unduly sceptical about the average capacity of aspirants for the public health service. He agreed that the requirements of the General Medical Council erred somewhat on the side of standardisation, but admitted the arguments in favour of a minimum standard, even if the minimum were not an adequate one. Many of Prof. Greenwood's criticisms, he said, would apply equally well to the ordinary medical course. The medical student could not hope to be equally proficient in all the subjects he was taught, but if he had no knowledge of them at all he would be correspondingly inadequate and unsatisfactory. The future medical officer of health must have a fairly complete syllabus. He was the general practitioner in preventive medicine. Sir Arthur looked forward to the day when the public and the private health services would be identical, when the general practitioner would be the medical officer of health for the families of whom he had charge, and the medical officer of health would play a minor part. He wished that the General Medical Council had included in its syllabus the practical training which every would-be medical officer of health ought to receive; which corresponded to the hospital work of the medical student. He had nearly always, when he was a medical officer of health, had a young man attached to him without a salary, who had sat at his elbow, gone on his visits with him, and assisted him with his office work and reports. Men who had had this experience were better trained than those who had not. The difficulty was that, although general culture was desirable, the public health practitioner had to be trained all round as a preliminary to his specialised training. He regretted that general practitioners and public health men alike knew so little of the science of social relations—of the questions of public morality and pauperism in relation to public health. This knowledge had a science attached to it, and was perhaps more important in the present complicated condition of social affairs than even vital statistics.

Dr. A. E. COPE said that the present-day "technicalitis" was only part of a much wider movement. The system of allowing candidates to choose their subjects had many advantages, but had the danger of increasing the formation of ruts in the minds of young people and developing technical at the expense of general education. The problem of post-graduate education was a hard one for the general practitioner, who found it difficult to leave his work and who sometimes, when he had left it, encountered restrictions and conditions which were very difficult to comply with. He often did not wish to take the full course, but to follow a limited bent. The London School of Hygiene and Tropical Medicine should make some provision on the lines of the University extension lectures, so that the general practitioner could refresh his knowledge where he needed it, and become familiar with the subjects which were most important.

Dr. C. E. MCDADE pleaded that teachers should be entrusted with examining boards and allowed to allot a certain number of marks for proficiency before the student went up for examination at all. The ideal was that each man should develop along the lines that suited him best.

Mr. ZACHARY COPE was thankful that there were no internal examinations on the medical side. The system was not only wasteful, but candidates were apt to do badly when examined by their own teachers. Public health should not be discussed apart from private health; the two were identical. He foresaw the time when all branches of medicine would be coördinated into a single service—not a State medical service but one which offered plenty of scope for private enterprise. The medical school and the public health school could do no more than cast the student into a certain mould, upon which his specialisation would depend. There must be a modicum of instruction. Dr. Johnson had said that the average man could always get a living at medicine. As the average man was pretty dull, the modicum must be fairly low. There was a great opportunity in the future for the municipal hospitals, with adequate organisation and coördination, to give practical instruction to the newly qualified. He hoped that the examination for the Fellowship of the Royal College of Surgeons would in future require that the candidate should have had practical experience.

Dr. WILLIAM SHACKLETON suggested that a man who had made a personal study of certain individual trees and their habits and growth might take a very good view of forestry. Perhaps a vision of the whole subject of medicine followed on the study of individuals.

Dr. JAMES BUCHANAN welcomed the new Diploma of Gynæcology and Obstetrics; this subject was the basis of general practice. Post-graduate courses on ophthalmology and diseases of the ear, nose, and throat would also be of great use. Moreover, the average general practitioner knew very little about skin diseases.

Dr. T. B. HAIG mentioned that general practitioners sometimes complained that the welfare officer took away their babies from their charge; the President suggested that they should learn more about welfare work.

Reply.

Prof. GREENWOOD assured the meeting that the students who sought instruction were not by any means to be despised, but were average men. The average men were those whom a competent teacher should seek to instruct, he should not concentrate upon the best students. Minor sicknesses, especially minor mental disorders, were much more important than cancer and tuberculosis; the London School of Hygiene was acting with great foresight in giving courses on the minor psychoses. The School was also trying to provide special courses to meet the individual needs of graduates. He thought the student was as likely to be tongue-tied before external examiners as before his own teachers. It was possible that the public had been encouraged overmuch to demand a long array of diplomas; the profession should set its face against this multiplication.

At the meeting the name of the Association was changed by resolution to the "Association of Local Government Medical Officers of England and Wales."

ROYAL SOCIETY OF MEDICINE.

SECTION OF OPHTHALMOLOGY.

AT a meeting of this Section on June 13th, with Mr. CYRIL H. WALKER, the President, in the chair, a paper entitled

AN EXPERIMENT IN KERATOPLASTY

was read by Mr. J. W. TUDOR THOMAS. He said that at the end of four years of experimental work in efforts to carry out transplantation on rabbits' corneæ the results he had achieved were so poor that it seemed hopeless to expect to obtain transparent grafts, such as in fact he later secured. These latter he had demonstrated at the annual congress of the Ophthalmological Society. The purpose of the experiment now described was to ascertain whether the retention of a very minute pedicle of corneal tissue would suffice to enable the graft to maintain its transparency. He made a rectangular incision into the cornea of a rabbit, penetrating the whole corneal thickness but retaining a pedicle, 2 mm. thick, at the postero-superior cornea. The rectangle

measured 7·5 × 4 mm., and the incision was across the centre of the cornea. Four stitches secured the flap in position. There was good union of the flap, and, with the exception of a marginal scar, the flap later became transparent. It was in this way shown that the keeping of a small pedicle enabled the graft to maintain its transparency. Though there was only 2 mm. width of pedicle, it sufficed to retain life in the graft and without loss of transparency. The graft was cloudy for a week after the operation, and at the end of a fortnight was still slightly cloudy. After three weeks it had become sensitive to touch over an area embraced from the 2 mm. pedicle to the posterior 2·5 mm. of the inferior margin. At this time the graft was clear in the sensitive area and somewhat beyond it, the rest being only slightly cloudy. At the end of a month it was clear except in the case of the marginal scar. In 13 weeks from the date of the operation sensation was normal all over the scar, except for about one square millimetre near the middle of the anterior end. Twenty-eight months after the operation the animal was killed, and microscopical examination of the sections showed that in general the graft was a little thicker than the remainder of the cornea, and that Descemet's membrane was at least as thick as the normal membrane; also it stained a little deeper. In the main graft there was no appreciable increase in the number of nuclei, but at the opaque margins of the graft the following changes were evident:—

The epithelium was thickened; there were six layers of cells, the basal ones being elongated. In this region the stroma contained twice as many nuclei, and there were numerous spindle-shaped spaces between the fibres. Between the free end of Descemet's membrane in the substance of the cornea and the posterior membrane the tissue fibres were coarser and more numerous; some iris pigment could be seen at the site of the anterior synechiæ, and the pigmented cells were covered by a layer of endothelial cells with a new Descemet's membrane. But a minute split was discovered between the two layers of Descemet's membrane; in places this split could be seen to extend throughout the whole breadth of the graft. A small detached portion of Descemet's membrane could be seen curled up in the region of the scar near the posterior surface, but covered posteriorly by the new membrane. This showed that detached portions of Descemet's membrane were but little altered in the course of years.

The appearances of Descemet's membrane in this case, said Mr. Thomas, agreed with the observations of others as to the healing of corneal wounds—namely, that the cut ends of the membrane did not unite, but were joined by the new membrane which was formed, either to unite the cut ends or to fuse with the posterior surface. In this case a new membrane had been formed, which passed quite across the graft and fused almost completely with the graft's original Descemet's membrane. It seemed clear that the marginal portion of the new membrane must have been formed by the endothelial cells of the surrounding cornea. The specimen showed that a new membrane could be formed under such conditions as obtained in this experiment, and over quite a large area, and that it actually covered and fused with the membrane of the graft. It did not accord with the view expressed by Weinstein that the new membrane was composed of differentiated corneal lamellæ. The experiment showed that retention of even a small pedicle of corneal tissue was a material help in revitalising the graft. His experimental experience had been that if a small pedicle had not been retained, even the same method of stitching as in the present case would have produced an opaque graft, and if the present graft had been left without stitches to secure it, the eye would probably have been useless, or at best there would have been a staphylomatous cornea.

With a clean perforating wound of the human cornea it was possible that corneal suturing might again give the patient a useful eye when a pad-and-bandage application might result in adhesion of the iris with a gaping wound, so that the eye must be removed. Such an accident as a penetrating wound of the cornea might occur in a man's only good eye, and if this grafting could be done without the risk of sympathetic trouble supervening, it seemed very desirable to try it. A large corneal wound tended to gape, the anterior chamber did not re-form, the iris became extensively adherent to the wound, and there was real risk of infection.

Discussion.

The PRESIDENT said he thought the eventual result of this fine and laborious piece of work would be great.

Mr. HUMPHREY NEAME pointed out that a section shown by Mr. Thomas in which a portion of Descemet's membrane was reduplicated was reminiscent of the sections seen in old interstitial keratitis. He had had such specimens to examine, either because of the supervention of glaucoma or because a blind eye had ruptured. Sections of such eyes showed a very thick new formation of fibrous tissue behind the remains of the old cornea, and the obviously ruptured Descemet's membrane was curled up in the same manner, and lying at the middle depth of the existing cornea. The new fibrous tissue was fixed and was most obvious in the lower part of the cornea, but in a much inflamed eye there was considerable formation of cellular material in the anterior chamber which accumulated in the lower part.

Mr. J. H. FISHER said it did not strike him that in the case described by Mr. Tudor Thomas the endothelium had spread in from the periphery to cover the posterior surface of the graft and secrete a new deposit of hyaline material. Apparently all the other tissues of the graft had survived well, and he saw no reason why the endothelial cells, in such an experiment, should not also retain their vitality. It was not, he thought, an ingrowing of epithelial cells from the periphery, but a survival of the cells on the deep surface of the graft, which, under the conditions of excessive activity, had produced a second layer.

Mr. MAURICE WHITING thought the value of Mr. Tudor Thomas's experiment lay in the possibility of usefully repairing wounds of the cornea. But when a cornea was wounded in actual life, the conditions differed from those in a laboratory experiment; the wound was caused by a relatively blunt instrument and so a good deal of injury was sustained by the cornea, and infection was very likely to supervene. During the late war he had several times tried to preserve a wounded cornea by means of a flap, but the attempted suture under those conditions in order to secure the wound edges usually resulted in even greater damage; therefore he fell back on the simpler pad and bandage to keep the flap in position. Conjunctival flaps he judged to be unsuitable under war conditions.

Mr. F. JULER commented on the fact that Mr. Tudor Thomas seemed to use a suture for each lip of the wound.

Lieut.-Colonel A. E. J. LISTER spoke of two cases of corneal wound in which conjunctival flaps were successful.

Mr. TUDOR THOMAS, in reply, said he did not know whether endothelium survived in the cornea, but probably it did. He agreed that wounds of the cornea in actual life were usually caused by a blunt instrument and were liable to infection, but even so, for a plain incised wound, suturing might be useful. In a clean wound, an edge-to-edge corneal suture was best. Animals, he found, tolerated corneal stitches very well provided they were not inserted right through the cornea.

BRIGHTON AND SUSSEX MEDICO-CHIRURGICAL SOCIETY.

CYCLOTHYMIA IN GENERAL PRACTICE.

AT a meeting held on June 5th, Dr. W. BARRINGTON PROWSE, the President, being in the chair, Dr. HELEN BOYLE read a paper on the Milder Forms of Manic-

depressive Insanity and Cyclothymia in General Practice. The term manic-depressive, she said, was of Kraepelin's classification and embraced, according to its author, a vast variety of conditions from acute mania to marked alteration of mood in the sane. She made a plea for several subdivisions under the heading manic-depressive, and called attention to the association between some manic-depressive states and thyroid disturbances (hyper-, hypo-, and possibly dysthyroidism), and also to a group associated with hyperpiesis, arterio-sclerosis, morbid intestinal states, and kidney trouble. Real progress could only be assured in the treatment of these cases by close coöperation between the general practitioners (who saw and treated all the early cases) on the one hand, and those specially interested in neuro-psychiatry on the other. This aim was now being pursued, and mental medicine, which had for long been crying in a wilderness inhabited by witches, spiritualists, criminals, and others, was being welcomed back into the fold of general medicine. This was especially desirable in connexion wth manic-depressive insanity in which the patients often have long periods of normality and of capacity for carrying out valuable work. In Kraepelin's classification manic-depressive insanity covered a wide field—including the whole domain of so-called periodic and circular insanity, simple mania, the greater part of the morbid states termed melancholia, a not inconsiderable number of cases of amentia (confusional or delirious insanity), and certain very slight colourings of mood. People liable to marked variations of mood were familiar to all, and all had suffered at times and at times rejoiced and benefited by the feverish energy, optimism, joy of life, and determination to put things through of cyclothymics. They were, in moderation, invaluable to the community. In their euphoric stages, short of insanity, they were sublimely self-confident, and superbly devoid of self-criticism and inhibitions, and by that temper which could feel no difficulties fine feats could be achieved. Cyclothymia, which signified a nervous or mental illness which showed a cyclic tendency, was a useful term to apply to the occurrence of mild manic-depressive states in patients who were not insane and very possibly never became so. Few would object to being called cyclothymic while many objected to manic-depressive as a description of their condition. After quotations from various authors showing the similarity between the hyper- and hypo-thyroidic illness and manic-depressive states, Dr. Boyle pointed out that in some of the latter there was a history of enlargement of the thyroid during adolescence, sometimes accompanied by cyclothymic tendencies. It would be of great value if practitioners would take note of this condition in schools or private practice and confirm or disprove the observation that it was a forerunner of cylcothymia in adult life. The treatment or neglect of adolescent thyroid enlargement would have to be modified, for it could hardly be doubted that the young persons suffering from this enlargement should be removed from competitive work or play of all kinds with its accompanying strain of anxiety.

The other group of manic-depressives, associated with a hyperpiesis which might show itself in early adult life, had one clear indication for treatment. The blood pressure, even when considerable, should only be reduced with great care; steam baths, colon douches, and other eliminative measures could be used. The high pressure was required for efficient excretion, and unless this was secured by other means an attack of insanity supervenes. In these patients 185 to 190 was usually the lowest limit of safety. One patient, after several severe attacks of insanity at fairly regular intervals for which she had to be certified, subsequently went through the rest of her life (some 10 to 15 years) without another attack. These patients in later life showed confusion and disorientation in their attacks. Even these attacks, if the blood pressure went up and elimination was successful, might clear up in 24 hours.

Reviews and Notices of Books.

RADIUM IN GENERAL PRACTICE.

By A. JAMES LARKIN, B.Sc., M.D., D.N.B., Radium Consultant on Staff of Wesley Memorial and other Hospitals; Instructor in Dermatology (Radium), Northwestern University Medical College. New York: Paul B. Hoeber; London: Humphrey Milford, Oxford University Press. 1929. Pp. 304. 27*s*.

THIS book is written for the practitioner and is commendably simple. It is, moreover, well adapted to its purpose, for it indicates clearly the cases in which he will and will not find radium therapy of service. It does not pretend to give the knowledge that will make him an expert in the technique, but it fulfils the author's intention of giving a quick reference to the therapeutic possibilities of radium in any particular type of case. The essentials of the mechanics and physics of radium are condensed into the first 16 pages, and the whole of the rest of the book is devoted to a detailed consideration of the treatment and probable reaction of the various pathological conditions that are influenced by radiation therapy. These are considered under four headings: (1) general diseases, which include the blood and ductless gland conditions; (2) gynæcological diseases; (3) miscellaneous tumours; (4) miscellaneous skin lesions. A list of about 70 simple and malignant types of disease are given separate consideration. An outline of the pathology, radium indications, prognosis, a typical condensed case-history, and a bibliography are given for each lesion. In this way the author places at the disposal of the practitioner a summary of the most important information available on the particular disease in which he happens to be interested. The method calls for repetition under each heading, but this does not matter since the author only touches lightly the salient features and avoids detail. In Dr. Larkin's practice and experience it is evident that the combined effect of X rays and radium has not received much consideration, in spite of the fact that in European clinics they are largely used together in the treatment of malignant disease. We could find only one reference to X rays in the book, and this is to the effect that X rays will only be employed where a sufficient quantity of radium is not available.

The book is, however, an admirable guide for the practitioner who wants to learn which of his cases are likely to be benefited by radium treatment.

DIABETES.

A Diabetic Manual for the Mutual Use of Doctor and Patient. Fourth edition. By ELLIOTT P. JOSLIN, M.D., Clinical Professor of Medicine, Harvard University, Boston, Massachusetts. Philadelphia: Lea and Febiger. Pp. 248. $2.

THIS manual is designed to teach both doctors and patients the elements of the principles which govern the treatment of diabetes mellitus. It is well adapted for this purpose, since the racy descriptions and clear sketches and photographs amply compensate for the author's rather diffuse style of writing. The dangers of the disease are explained with the errors which have caused them, and their treatment is clearly outlined. The directions for dieting are good, the diet tables, although very elaborate, are still drawn up in percentages, leaving the patient to do the calculating. Admittedly the patients or their attendants ought to be able to work out sums by the rule of three, but in practice many prove incapable of so doing. In parts of the book which have been revised, Dr. Joslin has begun to speak of 5 g. equivalents, and it is to be hoped that the next edition will see this change in the diet tables. The new carbohydrate values worked out by McCance and

Lawrence have not been adopted. A great change has been made in the carbohydrate ration. Instead of limiting the carbohydrate to 50 or 60 g., Dr. Joslin has increased it to 100 or even 150 g. This increase, of course, demands an increase in the insulin dosage, in order to maintain the blood-sugar at a normal level. This increase, however, is less than might have been expected. The additional amount of insulin necessary for an increase of carbohydrate of 100 g. is not 50 units, but only 30 or even 25 units. The general condition of the patients is improved on this diet, and the necessity for special diabetic foods disappears. Dr. Joslin adds a warning that it is more difficult for a patient to refrain from taking too much carbohydrate when he is already allowed so much, and draws attention to the well-known difficulty of the alcoholic in limiting himself to moderate amounts of alcohol. However, provided the additions are made cautiously, under medical supervision, with adequate amounts of insulin, this difficulty should not be insuperable. The sections on minor ailments, and especially that on the care of the feet of elderly patients, are especially good. The section on treatment of coma, though adequate for the patient, is hardly full enough for his medical attendant who will have to refer to a bigger manual.

Unbekanntes von Insulin. Von W. FORNET, Oberstabsarzt a.D. München: Verlag der Aerztlichen Rundschau. 1929. Pp. 41.

ALTHOUGH it is true that a great deal still remains to be discovered about insulin, Dr. Fornet has hardly advanced our knowledge. The natural desire, which is shared by all physicians, to be able to recommend as effective the oral administration of insulin has lead Dr. Fornet to examine the evidence in favour of the view that insulin is absorbed from the alimentary tract. Unfortunately, this evidence is presented in a very one-sided manner, and the experiments against the view are mostly ignored. Thus the experiments showing that raw pancreas given by mouth is effective are quoted, but the results of others who refute the claim are not mentioned. Dr. Fornet has endeavoured to prevent the action of pepsin and trypsin on insulin by protecting it with bile. The preparation made on this principle is given in pill form, and good results are claimed for it. The evidence produced, however, does not carry conviction.

SURGERY OF THE GALL-BLADDER.

Das Für und Wider der Chirurgischen Behandlung des Gallenleidens. By Prof. Dr. PAUL ZANDER, Chirurg des Elisabethenstifts in Darmstadt. Leipzig: Georg Thieme. 1930. M.8.50.

THIS is a review of the immediate and later results of 800 operations for disease of the gall-bladder and bile-ducts. The operations included 768 cholecystectomies and only three cholecystostomies. In 138 cases the bile-ducts were also opened, and in 81 some operation upon the stomach was performed as well. The analysis of the cases has been careful, and a number of lessons are to be learnt from the records. Perhaps the most interesting is the fact that among those patients who suffer from colic without stones and without pronounced naked-eye changes in the gall-bladder, only 42 per cent. are cured of their complaint when the gall-bladder is removed. There has been a tendency of late, especially amongst Scottish surgeons, to remove the gall-bladder from patients who have no gross lesion of the organ. Even where evidence of disease can be obtained by microscopic examination or culture of the wall, it seems that adaptation to loss of the gall-bladder when its function has not been gradually destroyed is difficult. There is a 90 per cent. complete recovery-rate in hydrops of the bladder, and a 79 per cent. rate when stones or suppuration confined to this organ are present. The results get worse when infection has spread to the ducts. Obviously, then, early operation is desirable in the presence of infection, but the fact that intervention in conditions where stones are absent and inflammatory changes at a minimum is not very successful must be remembered. It would be interesting to test the effect of cholecystostomy in these patients, and to ascertain whether or not the dye test would enable the surgeon to select those cases likely to benefit from operation. This book gives a fair survey of the surgical treatment of gall-bladder disease, and deserves attention.

ESSENTIALS OF MEDICINE.

Ninth edition, revised. By CHARLES PHILLIPS EMERSON, M.D., Professor of Medicine, Indiana University. London: J. P. Lippincott Company. Pp. xx. + 588. 12*s.* 6*d.*

THE ninth edition of this well-known text-book, designed essentially for junior students and nurses, has been thoroughly revised with the assistance of Miss N. G. Brown, R.N., assistant director of the Indiana University Training School for Nurses. The easily read, narrative style, the general clear presentation of the subject, the well-chosen illustrations, and the detailed table of contents combine to make a useful volume which lay people interested in medicine might also read with advantage.

OXIDATION-REDUCTION POTENTIALS.

By L. MICHAELIS, M.D. Translated by LOUIS B. FLEXNER. London: J. B. Lippincott Company. 1930. Pp. 197. 12*s.* 6*d.*

THE measurement of oxidation-reduction potentials has proved in the hands of Mansfield Clark and his co-workers in Washington so useful in the study of purely chemical oxidation-reduction systems that the results so far obtained by application of the same methods to biological systems are disappointing. The reasons for this are made clear by Prof. Michaelis's admirable analysis of the problem, in which his own fundamental work on the electrode potential of cysteine is presented in a new light. Although his conclusions tend to throw doubt on the value of much of the work, his criticisms are sound and will place the whole subject on a firmer basis. One of his most important contributions concerns the nature of the potential established at an indifferent electrode by sulphydril bodies which are present in all tissues. He shows that in the presence of oxygen the electrode is not indifferent—it is attacked—so that the potential is not a true oxidation-reduction potential. This fact alone obviously places grave restriction on the use of electrodes in the study of living systems. He also points out the fallacy of speaking of the oxidation-reduction potential of a living aerobic system, since the existence of a definite potential implies a true equilibrium which is incompatible with life; we may speak of the potential of the tissue fluid of the culture medium, but not of the potential of the cell or the bacteria. The book has been translated by Louis Flexner, who is well-known for his work in this field. It opens with a complete theoretical discussion, the second part being devoted to physiological applications. Dr. Michaelis's exposition of the limitations as well as the possibilities of the study of oxidation-reduction potentials as applied to biological problems will clear the ground and deserves careful study.

MECHANO-THERAPY.

A Text-book for Students. By MARY REES MULLINER, M.D., formerly Instructor in Mechano-Therapy in the Summer School of Harvard University, and in the Sargent School for Physical Education. Philadelphia: Lea and Febiger. Pp. 265. $2.75.

THIS is an interesting and well-constructed book. The general advice offered to the student of massage is excellent, and well worthy of close attention not

only by the practising masseuse but by the practitioner who employs her. A few curious slips are noticeable—such, for instance, as the statement that callus consists of cartilage, but they are few and far between. The nomenclature given to the movements of massage is confusing, but this is a point which need not be stressed, since no standard nomenclature is available. The short notes on "contra-indications for massage" are inadequate.

Throughout the book the right impression is left that the cure of the conditions treated by physical treatment does not depend entirely upon the operator, but much on the help of the patient. Particularly good are the chapters on the prescription of exercises and on relaxation; and, had the very high standard of the first seven chapters been maintained in the latter part of the work, this little book would deserve nothing but praise. At this point, however, there is a curious falling-off; indeed, the book leaves the same sort of impression as the paper of an examination candidate who, having devoted all his energies to answering the first few questions, becomes too tired to maintain a high standard. The early treatment of injuries is advocated, but not described, and far too much stress is laid on massage as distinct from treatment by movement. Few injuries are dealt with separately, and those who require help in this matter must seek it elsewhere. The accurate writing in the first pages gives place to such grotesque statements as that "massage may grind away these bony growths" (p. 174). The standard of the book improves again towards the end with occasional lapses, and little fault can be found with the chapters on digestion, the heart, and the central nervous system. It is curious that a subject like neuritis should be disposed of in half a page, and that peripheral neuritis should not be mentioned.

The book is concise and well written. The bibliography adds materially to the value. It might very easily be made the best of the short books on this subject of which the importance is becoming more generally recognised. If this end is to be attained considerable additions must be made, and some at least of the subject matter will have to be rewritten.

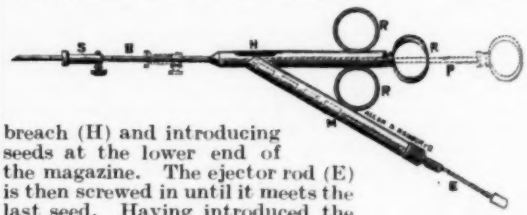
JOURNALS.

BRITISH JOURNAL OF CHILDREN'S DISEASES. Vol. XXVII., April–June.—Dr. N. Gray Hill contributes a paper entitled Notes on the Treatment of Juvenile Rheumatism based on the study of over 500 cases treated at Queen Mary's Hospital, Carshalton, since 1927. He discusses the various therapeutic methods, such as rest, heliotherapy, tonsillectomy, drugs, vaccines, and serums, and states that the basis of the treatment at Carshalton is rest under good hygienic conditions with a very gradual return to the normal activities of life. Although no specific treatment has been found up to the present, there are indications that calcium therapy may prove of value.—In a paper on Indications and Contra-indications for Removal of Tonsils in Children, Dr. P. D. Davidoff, of Taganrog (Russia), reviews the literature and records six personal cases in which tonsillotomy or tonsillectomy was performed with beneficial results for various conditions besides chronic tonsillitis.—Dr. D. Sage Sutherland contributes a paper on Gangrene Associated with Scarlet Fever, in which he emphasises the rarity of the condition, and records two personal cases. The first was that of a Jewish boy, aged 4½ years, who on the eighteenth day of a mild attack of scarlet fever developed gangrene of the left leg. A definite line of demarcation appeared just above the knee in the fourth week. A diagnosis of embolic gangrene was made and amputation was performed a fortnight later. No evidence, however, of thrombosis or embolism was found in the amputated limb. Recovery took place. The second case of gangrene occurred in a boy, aged 4 years, suffering from post-scarlatinal nephritis and otitis media, who developed purpura fulminans on the thirty-sixth day of disease and died on the forty-second.—Dr. Meta Mackenzie reports a case of Acute Hæmorrhagic Pancreatitis in a Congenital Idiot. The patient was a girl, aged 3 years, who developed acute abdominal symptoms after an attack of septic sore-throat and died suddenly. The autopsy showed a condition of acute hæmorrhagic pancreatitis with almost complete necrosis of the organ. All the other organs appeared normal, and nothing could be found in the brain to account for the sudden death.—Dr. A. V. Neale records a fatal case of acute anaphylactic shock. The patient was a girl, aged 6 years, who had never had any previous injections of serum or protein, but had been subject to attacks of shortness of breath since infancy. Thirty minutes after injection of hæmostatic serum to check hæmorrhage caused by tonsillectomy death occurred from respiratory and circulatory failure. A conspicuous feature post mortem was complete absence of coagulation of the blood. The thymus was normal.—The abstracts from current literature are devoted to acute infectious diseases.

New Inventions.

A NEW RADON SEED DEPOSITOR.

THE intention of the instrument here illustrated is to overcome the rather slow and tiresome operation of loading the gun each time with one seed; only one rod (P) is used and need not be taken out of the instrument at all, as is done in other models. (M) is the magazine lined with 2 mm. of lead which will hold about 15 0·5 cm. or eight 1 cm. radon seeds. The magazine is loaded by ramming home piston rod (P), which closes the opening of (M) into the open breach (H) and introducing seeds at the lower end of the magazine. The ejector rod (E) is then screwed in until it meets the last seed. Having introduced the barrel (B) (ruled at 1 cm. intervals up to 10 cm.) into the tissues, the rod (P) is pulled back until it is clear of the breach (H)—a slight turn of the rod (E) which is a spiral, pushes up the column of seeds and *under direct vision* one seed is seen to appear and lie in the breach; rod (P) then pushes it on and out of the barrel (B). This process can be repeated in quick succession and the magazine emptied. The ring, finger and thumb grips (R R R) facilitate the use and steadying of the whole instrument. (S) is a sliding sleeve which may be fixed at any point along the ruled barrel (B). The rod (P) is bevelled slightly at its distal end and acts both as a needle and a pusher quite effectively. The instrument is heavy, simple, effective, and saves time. I would draw attention to two points; the breach is left open above deliberately to enable the operator to see one seed properly and safely introduced. It is absolutely necessary to allow one seed only to lie in the breach—the oncoming seed, if pushed too far by the fine adjustment rod (E) will foul the rod (P) when it is pushed home. The knack is easily acquired.



The makers are Messrs. Allen and Hanburys, Ltd. of Wigmore-street, London, W.

W. ETHERINGTON WILSON, F.R.C.S. Eng.
Torquay.

NATIONAL HOSPITAL, QUEEN-SQUARE.—From July 2nd the out-patient department of this hospital will be open from 1 P.M. on Wednesdays. Under this new arrangement out-patients will be seen each afternoon except Saturday.

THE LANCET.

LONDON: SATURDAY, JUNE 21, 1930.

REMOVAL OF THE PROSTATE.

IN his Lettsomian lectures on enlarged prostate and prostatectomy, publication of which was completed in our last issue, Sir JOHN THOMSON-WALKER has given us a shining example of the way in which progress is made in medicine and surgery. To every scientific advance innumerable workers contribute their quota, and whilst some may have given more than others to no single individual can be accredited all the merit of the final victory. Moreover, as the history of prostatectomy shows, progress is not necessarily continuous. Periods of stagnation and even of retrograde movement alternate with periods of progress. Unfortunately, in dealing with the enlarged prostate surgeons have not always recognised so clearly as has Sir JOHN THOMSON-WALKER this fundamental truth, and in the past an unwholesome rivalry has centred round the question who was the true discoverer of the modern operation of suprapubic prostatectomy. For this reason Sir JOHN THOMSON-WALKER'S excellent historical survey is to be welcomed, holding as it does a just balance between the rival claims of different pioneers and of different schools of urology.

Although the French surgeon AMUSSAT had removed an enlarged middle lobe with scissors by the suprapubic route in the year 1836, the story of prostatectomy really commences with McGill's operation in 1887. But from his own writings it is clear that McGill, however valuable we may deem his contribution to prostatic surgery, was content with the removal only of that portion of the prostate that projected within the bladder. Whilst this was a step forward in proving that enlargement was amenable to surgical intervention, the operation itself gave inconstant results. Dissatisfaction with McGill's operation of partial prostatectomy was soon voiced by BELFIELD of Chicago and KÜMMEL of Hamburg. Since normal micturition was not invariably restored by the removal only of the intravesical projection it was obviously necessary to deal with the remaining portion of the gland. As this was difficult by the suprapubic route, attention was directed to a new approach—namely, through the perineum. GOULEY of New York, HENRY MORRIS at the Middlesex Hospital, and ZUCKERKANDL of Vienna, all made attempts to remove the gland by the perineal method but with variable success. That the encouragement to push this line of attack was slight is indicated by the appearance at this moment of a new method of treatment which for a time stopped further progress. Working on the analogy existing between uterine fibromyoma and prostatic overgrowth, J. W. WHITE of Philadelphia suggested that a shrinkage of the enlarged gland might be obtained by the removal of the gonads. Castration therefore for a time was adopted as the easiest method of dealing with enlargement, but this mutilation gave results that were no more constant than those obtained from partial prostatectomy. Moreover, severe mental disturbance often followed castration in those patients who already displayed a degree of mental instability. Resort was had to vasectomy in an attempt to avoid this difficulty, but, although HARRISON and ROVESING recorded cases of cure from this procedure, it became increasingly clear that indirect methods offered little promise of victory over prostatic enlargement. The year 1900–01, as Sir JOHN THOMSON-WALKER aptly puts it, showed the renaissance of prostatic surgery. Those who had wandered from the path and sought a way round the difficulty retraced their steps. Partial prostatectomy both by the perineal and the suprapubic route found new advocates and again became the routine method of treatment of prostatic obstruction. At this moment FREYER made his appearance on the stage and by his publication of four cases treated by a "new and at first sight formidable operation" called the attention of the world to the possibility of completely removing the enlarged gland. Not that FREYER'S advocacy of total prostatectomy was received with universal favour after the publication of his successful cases; MAYO ROBSON, for example, had no hesitation in describing the complete extirpation of the prostate in its capsule as impracticable from an anatomical point of view. The confusion that then existed concerning the pathological anatomy of enlargement and the surgical anatomy of enucleation has continued in a minor degree until the present time. But FREYER'S success stimulated surgeons all over the world to attack the prostate directly and the death-blow was given to the idea of indirect surgery.

In his later lectures Sir JOHN THOMSON-WALKER discusses the refinements of the operation. Of these the most important are the methods of controlling hæmorrhage and the means of assessing the functional activity of the kidneys before operation. Whilst hæmorrhage was the more dramatic complication it was slowly realised that renal failure after the operation was a more frequent cause of death. Laboratory methods of estimating renal function were introduced to supplement clinical observations, and for those whose renal function tests worked out below a certain level a two-stage operation was instituted. Finally, the lecturer himself became a strong advocate of a new technique, the object of which was to bring prostatectomy into line with other operations and to substitute for blind enucleation an open operation carried out under full ocular control. As the recent discussion in the Urological Section of the Royal Society of Medicine has shown,[1] this operation is now in general use amongst British prostatectomists, although there are still some who consider that it is unnecessary and that the additional time entailed in carrying it out counterbalances any advantage it has to offer. At this point Sir JOHN THOMSON-WALKER'S interesting historical summary of prostatectomy ends, for it is here that we stand at the present moment. In spite of the knowledge we have gained, in spite of the improvements we have introduced into our operative technique, prostatectomy is still an operation that carries with it an unnecessarily big mortality. Speaking generally, it may be said that the nearer a technique approaches to the ideal the less are the variations introduced into its practice by different operators. That we are far from having reached uniformity in the carrying out of prostatectomy was amply demonstrated at the Royal Society of Medicine. We still have far to travel.

[1] See THE LANCET, May 31st, p. 1184.

THE CAUSES OF FOOD POISONING.

WHILE the tendency during the last two decades has been more and more to regard the salmonella group of bacteria as the most important cause of food poisoning, it is clear that this organism cannot be held responsible for every poisoning outbreak outside the rare cases of botulism. W. G. SAVAGE and P. BRUCE WHITE have shown that certain dysentery strains produce food poisoning. Again, the *Bacillus proteus* group has often been brought forward, but here the supporting evidence has been slender, and a very clear case would have to be made out before any particular outbreak could be accepted as having such an origin. The same is true of the *B. coli* group, where the evidence has been even less cogent. On the other hand, there have been many outbreaks of gastro-intestinal disturbance in which bacteriological investigation has drawn a blank, and the responsible organism has been undetected. This has happened especially in mild outbreaks associated with consumption of cheese and milk, and in some of them the possibility of salmonella infection can be ruled out.

Recently in Chicago two sets of observations have suggested a new possibility. DACK and co-workers[1] have described an outbreak of food poisoning affecting 11 persons after eating three-layer sponge cakes filled with cream. Nine were acutely ill with vomiting, mild cramp, and severe diarrhœa, with an incubation period of one and a half to four hours; all recovered. The separate different components of the cake were without ill-effect when fed to monkeys and to human volunteers, but a volunteer who ate 50 g. of the sponge cake substance itself developed symptoms closely resembling those of the original sufferers. Bacteriological examination of the cake substance showed a yellow hæmolytic staphylococcus as the most prevalent organism. A human volunteer who drank 25 c.cm. of a sterile filtrate from a broth culture was ill exactly three hours later with extreme prostration, diarrhœa with blood and mucus in the stools, and apparently some vomiting. Two other volunteers who drank 10 and 5 c.cm. respectively had minor symptoms. Following up this experience Prof. E. O. JORDAN,[2] the head of the same laboratory, tested the effect of other staphylococci, and isolated five strains which yielded filtrates, toxic when taken by the mouth. Three were obtained from normal human throats, one from a case of human septicæmia, and the other from cheese suspected of causing an outbreak of food poisoning in a village in Porto Rico. These five strains, and also the cake strain, differed from one another culturally, so they do not represent a homologous type. The method of testing employed was to filter 48 hours'-old broth cultures through Berkefeld filters and, after testing for sterility, to feed to human volunteers in doses of 5 to 10 c.cm. given in pasteurised milk. About 80 feeding tests were made on 48 male volunteers, and in most of them symptoms of mild food poisoning developed several hours afterwards. These symptoms included dizziness, loss of appetite, weakness of the legs, headache, abdominal pain, nausea, vomiting, and diarrhœa. They were transient, and usually by next morning the patients were quite well. Boiling, and even heating for 30 minutes to 60° C. or 65° C., destroyed the potency of the toxins.

Prof. JORDAN concludes that various strains of staphylococci of diverse origin and different cultural characters are capable of generating in broth a substance which, when taken by the mouth, produces gastro-intestinal disturbance, and he suggests it is not unlikely that bacteria of other groups may produce similar substances that are irritating to the human alimentary canal. If these observations are confirmed and found applicable to this country it may be possible to explain more of our minor food poisoning outbreaks. Animal experiments are, however, almost useless for this type of investigation, and the Chicago investigators seem to have been particularly fortunate in having at hand an unlimited supply of "subjects" willing to offer themselves for experimental purposes.

[1] Dack, G. M., Cary, W. E., Woolpert, O., and Wiggers, H.: Jour. Prev. Med., 1930, iv., 167.
[2] Jour. Amer. Med. Assoc., 1930, xciv., 1648.

EXPERIMENTAL CARCINOGENESIS.

THE production of cancer in laboratory animals was a most important advance in modern medicine, and the possibilities of the method are now being exploited along different lines by a great many workers. One advantage of working with such a short-lived animal as the mouse is that cancer can be produced in a relatively short time under experimental conditions. A large amount of pathological material can be collected by a single group of workers for the investigation of any one of the numerous problems of cancer in the time it would require to collect a few isolated cases in man. The paper published in our columns by Dr. C. C. TWORT and Mr. J. M. TWORT is based on 4000 tumours of the skin produced by exposing over 29,000 mice to the action of various carcinogenic agents. Of these tumours 1743 were malignant, and the paper is an attempt to classify the different types of growth which have been observed. It is remarkable how great is the variety of forms in which the process of malignancy can express itself in one and the same tissue; under the influence of a carcinogenic agent the cells of the epidermis, or of the hair follicles, or of the sebaceous glands may become malignant. Morphologically the malignant cells themselves may show wide variations, even taking on the shape of spindle cells so as to resemble a sarcoma. Most of these appearances have been described before, but not on such an extensive scale. What is new, however, is the suggestion that the change to the spindle form is due to septic infection of the growth. The prickle cell, being unable to withstand sepsis, would be destroyed by infection, unless it underwent metaplasia into the spindle-cell type which is supposed to be more resistant. Change in morphology of the cells is attributed by the authors to the influence of neighbouring cells; they refer to this change as "a fundamental biological phenomenon." It is a very interesting suggestion, but before it can be accepted more conclusive evidence is required. The experimental methods of transplantation and of tissue culture might help to throw light on the point.

A very different line of investigation has been pursued by Dr. E. L. KENNAWAY and his associates. Since the normal carcinogenic agents, such as tar or shale oil, are crude mixtures containing a large number of different substances, Dr. KENNAWAY has been working on the assumption that these mixtures owe their carcinogenic action to the presence of a chemical substance which has the specific property of producing cancer. Although it is not clearly stated, he seems to consider it possible that when cancer arises spontaneously this may be due to such a substance being produced by the cells of an organ when they are submitted to chronic irritation—a working hypothesis applied with much experimental

skill and resource. In a series of extensive investigations[1] Dr. KENNAWAY and his co-workers have prepared and tested a large number of organic substances, some of them fairly pure, while others have been mixtures obtained by the action of heat or of aluminium chloride on relatively simple organic compounds. The object of using the reaction with aluminium chloride was to seek for carcinogenic compounds formed at lower temperatures. It was found, however, that while the undistilled material was inactive, distillation under reduced pressure produced a fraction, boiling at 260°–320° C., which was actively carcinogenic. It appears, therefore, that the carcinogenic substance was produced by the heat of distillation, and that the original object of producing carcinogenic substances at body temperature was not attained. Of the number of simple substances tested 1 : 2 : 7 : 8-dibenzanthracene was the only one which was clearly carcinogenic. Contrary to expectation the carcinogenic power of this simple substance was weak, the period of induction being very long. So far the results do not support the idea of a specific carcinogenic agent, and Dr. KENNAWAY'S further researches on this point will be awaited with great interest.

In the course of these observations Dr. I. HIEGER,[2] working with Dr. KENNAWAY, observed that many of the substances having a carcinogenic action possess the property of fluorescing intensely when exposed to ultra-violet light. In studying with a spectroscope the fluorescence of a number of substances which were also tested for their carcinogenic property, he found that many substances producing cancer had a characteristic spectrum. It may be possible, therefore, to use the spectrum of a substance as an indicator of its probable carcinogenic activity; for final proof a test on mice would remain necessary. Since certain heavy petroleum oils have been shown to be carcinogenic the fear has been expressed that the refined petroleum oils, taken internally for medicinal purposes or applied externally to the skin or nasal mucous membranes, might produce cancer. A priori the suggestion is improbable, for these materials have been used extensively over a number of years without producing any ill-effect. Prof. F. CARTER WOOD, of New York, has submitted[3] the question to exhaustive test both by external application to mice and by internal application to rats and mice. As was to be expected, these refined products were found to be entirely non-carcinogenic.

[1] Biochem. Jour., 1930, xxiv., 497.
[2] Ibid., p. 505.
[3] Jour. Amer. Med. Assoc., May 24th, p. 1641.

PROPOSED EXTENSION OF ST. MARY'S HOSPITAL, LONDON.—The annual report gives details of the extensive enlargements which it is proposed to make at this hospital. The scheme of immediate development comprises a pay-bed unit of 30 beds obtained by the conversion of a floor of the existing nurses' home, the provision of increased maternity accommodation, made possible by the rehousing of the inoculation department, which will set free some 50 beds, and the erection of the first block of the new nurses' home which will house 224 nurses. The general scheme provides also for the rebuilding of the medical school and the erection of a new inoculation department and institute of pathology and research. For these purposes an appeal for £250,000 will be made. Last year in-patients numbered 4995, their average stay was 22 days, and the average annual cost per occupied bed (average 302) was £181 3s., £21 below the average of the London teaching hospitals. It is pointed out as a financial weakness that 22 per cent. of last year's income was derived from legacies and grants from residuary estates which are necessarily uncertain and fluctuating.

Annotations.

"Ne quid nimis."

THE PÆDIATRIC CONGRESS AT STOCKHOLM.

IT is to be hoped that this country will be strongly represented at the International Pædiatric Congress[1] to be held at Stockholm from August 18th to 21st. The attendance from abroad is likely to be large and influential, but it is felt in Sweden that the Congress cannot be a complete success without active British coöperation. On such occasions the main advantage usually comes from personal contact between people interested in the same specialty, but the official discussions will be noteworthy if we may judge from the names of the contributors. The first subject, introduced by A. F. Hess, of New York, will be the Biological Effect of Direct and Indirect Ultra-violet Irradiation, and the speakers will include P. F. Armand Delille (Paris), K. Huldschinsky (Berlin), P. Medowikoff (Leningrad), and I. Jundell (Stockholm), who is chairman of the Swedish organisation committee. The second big discussion will be on the physiological and pathological significance of the thymolymphatic system, and the principal speakers will be J. A. Mammar (Upsala), C. Cattaneo (Milan), E. Moro (Heidelberg), and G. Mouriquand (Lyon). On the fourth day R. D. Gillespie (London), together with F. Hamburger (Graz), N. Krasnogorski (Leningrad), and V. Pechère (Brussels), will bring before the Congress the significance of the psychology and pathopsychology of childhood in its relation to pædiatrics and medico-social work. Outside these meetings there will be many lectures and individual communications, and after the Congress excursions may be made both near and far. Further information about the programme and arrangements may be had from Dr. J. C. Spence, 3, Eslington-terrace, Newcastle-on-Tyne, who is the secretary of the British committee of the Congress. The other members of this committee are Dr. Robert Hutchison, Dr. H. Morley Fletcher, and Dr. Donald Paterson.

[1] See THE LANCET, March 22nd, p. 639.

THE CLINICAL FORMS OF OBSESSION.

OUR French colleagues have always paid great attention to the minor mental disorders, and in their "Obsessions et la Psychasthénie" (1903) Raymond and Janet describe what appears to some English readers as an unknown world of symptomatology. Dr. C. Vurpas, a physician of the Salpêtrière, takes up the subject in the *Presse Médicale* of June 4th, and points out how the sufferers hide their troubles from their friends and carry on with the affairs of life even though the symptoms lead to serious disturbances of conduct. The bookkeeper who must continually verify his accounts and his cash cannot carry out his work satisfactorily, nor can the waiter who must ceaselessly count his money till he loses himself in his calculations. How many unhappy homes, Vurpas asks, are to be explained by the obsessions and phobias of one of the spouses? Overscrupulous self-questioning may progress to haunting doubts of every action, till the sufferer's only refuge is a breakdown, during which he is spared the need of adjustment to the demands of ordinary life. The clinical descriptions given by Vurpas create an uneasy feeling that in this country the facile acceptance of "neurasthenia" or "nervous breakdown" as a diagnosis may hinder full understanding of the conditions we are treating, and those who are accustomed to seek for such symptoms as Janet described are not surprised to discover them concealed under such diagnoses. The concealment can be understood when we remember that the essence of an obsession —when the word is used in its proper sense—is that

the symptom is recognised by the patient as absurd and irrational and is therefore to be hidden from the world. The frequent association of the disorder with high intellectual ability and devotion to work suggests that some puzzling cases of suicide, in which the victim is described as having possessed those qualities, may have their explanation in an unsuspected obsessional state, or, as Vurpas would express it, in a constitutional psychasthenia. He believes that in the true psychasthenic there are minor indications which, apart from the obsessions, reveal the psychical constitution; when these indications are absent the case belongs to some other group, commonly the manic-depressive, and this observation may help in the recognition of certain cases which, beginning apparently as obsessional states, falsify the resultant prognosis and become certifiable as frank melancholia. Obsessions may also, he thinks, mark an early stage of dementia præcox or general paralysis, may appear as fugitive symptoms in senile or arterio-sclerotic psychoses, or evolve parallel with another psychosis. Thus the obsessional symptom occurs in a larval form compatible with ordinary social life, being then controlled or even dissimulated; it often leads to a temporary breakdown or permanent incapacity; it is sometimes a part of a psychosis belonging to a well-defined clinical group. Although Vurpas follows Janet in regarding psychasthenia as a constitutional disorder for which only palliation is possible, yet more hopeful views are held as to the accessibility of these patients to analysis. His discussion of clinical possibilities is, therefore, of interest to the general practitioner who might overlook an important group of troubles, to the psychotherapist who must carefully select his cases for treatment, and to the psychiatrist who has the opportunity of watching the evolution of the psychoses.

DISCIPLINE IN MUNICIPAL HOSPITALS.

In the army, the navy, the police force and other public services it is well understood that a clearly defined channel must be provided for the making of complaints. It is certain that there will always be grumblers, but it is equally certain that some grumbles will be justified. The sense of unfairness and injustice is not so bitter if the supposed grievance can be reported, investigated and dealt with by a known superior officer under some open and well-recognised system. The same principle applies to service in the nursing staff of a hospital. Prevention being better than cure, disciplinary difficulties may often be averted if the persons concerned are clearly instructed in their rights and duties. The public assistance committee of the Birkenhead Corporation recently had occasion to consider this question in connexion with the administration of a poor-law infirmary which the corporation had taken over under the Local Government Act of last year. The incidents which led to the inquiry are of no public concern; the recommendations which resulted are of more than local interest. Those who have any share in the organisation of a municipal hospital may usefully examine their own disciplinary conditions; if they have made no provision for the ventilation of grievances they should study the admirable report drawn up by Dr. D. Morley Mathieson for the public assistance committee at Birkenhead as the result of the recent inquiry and published in the *Medical Officer* for June 7th (p. 257). Discipline, as he observes, must be maintained. Discipline does not mean oppression; it means efficiency, precision, balance, fairness, self-control and harmony; the alternative to discipline is disorder. The hospital committee must support the medical superintendent and matron; the matron must support the sisters, who are her lieutenants. A matron cannot discuss a sister with a probationer; a member of the committee cannot discuss a matron with a sister, or a sister with a probationer. The nursing staff cannot approach individual members of the committee to voice grievances or discuss their conditions of work. Members of the nursing staff must be instructed that they are never to discuss hospital matters outside the hospital. Gossip about the patients or the staff is unprofessional and a serious breach of hospital discipline.

Dr. Mathieson's recommendations for the improvement of hospital discipline may be briefly summarised. He suggests that a log-book be provided for each sister wherein all reprimands and complaints are to be recorded. Minor corrections and admonitions such as normally occur in a probationer's training are not to be reckoned as reprimands for this purpose. But if a sister has occasion to reprimand a probationer for neglect of duty, disobedience, insolence, breach of rules or gross breach of nursing practice or for any other reason of like gravity, the sister will enter the full facts in her log-book. A complaint by a probationer is similarly to be entered. In either case both sister and probationer will sign the entry. If the probationer declines to sign on the ground that the entry incorrectly records the matter, there is to be an immediate reference to the matron, who will investigate forthwith and, if necessary, consult the medical superintendent. In certain events there is to be an appeal to the sub-committee. Where the reprimand concerns a sister, or where a sister makes a complaint, similar records will be made by the matron The purpose of this machinery is to ensure the prompt and regular disposal of matters of complaint, and thus to prevent the nursing of grievances and the demoralising effects of cavilling and other forms of disloyalty. The machinery should be as simple as possible. Recourse to it will not be frequent if those in charge of subordinate staff avoid ill-temper, undue severity and unfairness. "A good disciplinarian," says Dr. Mathieson, "has no need to employ despotic or spectacular methods, and is kindly, impartial and even-tempered when dealing with subordinates; this is especially so when any reproof or correction is called for."

SO-CALLED SCIATICA.

That man's assumption of the erect attitude has much to do with many cases of sciatica is becoming increasingly evident, and A. P. MacKinnon [1] says that he regards most cases of sciatic pain as due to some disturbance in the fundamentally unstable sacro-iliac or lumbo-sacral joints. Goldthwait, Smith-Petersen, and Danford and Wilson in America, and Sicard and Putti in Europe, have drawn attention to the part which strains, injuries, and disease of the lower part of the spine may play in producing pain along the course of the sciatic nerve. C. W. Buckley [2] in this country found that in 108 patients complaining of sciatic pain the main underlying conditions were osteo-arthritis of the hip (30 cases), lumbar and sacro-iliac strain (26), neuritis of the sciatic nerve (20), and sacralisation of the last lumbar vertebra (9)—or, to put it another way, only 20 of his cases had a neuritis of the sciatic nerve. MacKinnon looks on lumbo-sacral arthritis as the main cause, and thinks that other pathological conditions, especially sacro-iliac disease, are of minor importance. It is true that the anterior ramus of the fifth lumbar root, which plays such an important part in the formation of the sciatic nerve, is the largest of the emerging nerves, passes through the smallest intervertebral foramen, and has the longest bony canal to traverse before it reaches the cavity of the pelvis. On the other hand, our methods of differentiating lumbar arthritis and strains, sacro-iliac and lumbo-sacral disease are still so unsatisfactory that it is hard to accept his claim that the large group of cases previously classed as idiopathic sciatica should be regarded as symptomatic sciatica due to lumbo-sacral arthritis. If this were true the good results reported from local treatment of the nerve trunk itself would be difficult to explain. The nomenclature of sciatica will remain somewhat

[1] Canad. Med. Assoc. Jour., April, 1930, p. 492.
[2] Buckley: Practitioner, June, 1930, p. 653.

chaotic till more is known of the cause or causes. It is fairly certain that patients will stick to the familiar word, and practitioners will know exactly what they mean, especially if they too have suffered. There are few terms in medicine which are so definitive in the mouth of a patient, and at the same time so apt to mislead writers and readers of medical literature. There is much to be said for Sicard's classification of sciatic pain into high, middle, and low, according as to whether the mischief arises in spine, pelvis, or buttock and thigh. As Buckley points out, this is a useful differentiation for purposes of diagnosis.

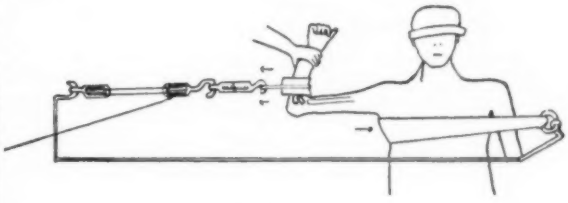
HOSPITAL LIBRARIES.

THE address given by Dr. C. Hagberg Wright at St. James's Palace during the recent British Empire Red Cross Conference was a timely reminder of an undertaking which has a great future as well as a very creditable past. The hospital library scheme, started by Mrs. Gaskell early in the war, was run on a vast scale by the British Red Cross and the Order of St. John. The war over, the marvellous stream of books to hospitals began to wane, but so urgent was the demand for books, and more books, by those who had known their stimulus and cheer that the Joint Red Cross Council gave a fund for the continuation of the scheme; and to-day the library is housed at Lancaster Gate, and carried on, in over 2000 hospitals, by a very small staff. Appeal is constantly being made to the public for books and magazines, which are distributed to hospitals that ask for them; when required and whenever possible, special technical books in addition are bought and supplied. But although the work has been unobtrusive, the realisation that libraries in hospitals should mean something more fundamental than a mere collection of books has begun to take root and to grow towards not only a national but an international ideal. America has an extensive and highly developed system of hospital libraries; Germany is giving close study to it, and efforts are being made in other countries. Public opinion is awakening to the necessity of a well-stocked library as part of the curative equipment of every hospital. But the well selected library is only the first stage of the work. It is of little value unless the books are distributed according to the tastes and the physical condition of individual patients. This means a system of librarians with knowledge of psychology as well as of literature. Sometimes a member of the hospital staff combines these duties, but more often a volunteer from outside has to be found. Methods vary in certain countries and their comparative merits await further study. In the stage that has been reached certain facts stand out clearly. First, hospital libraries depend for their success on wide study and above all on public opinion. The Hospital Officers' Association is taking a keen interest in the movement, and the February issue of the *Hospital* outlines a scheme for running a library in a large London hospital. In the Manchester Royal Infirmary a rota of Toc H members in conjunction with their league of women helpers distribute books to patients five nights in the week. Such libraries need the backing of the great body of doctors, nurses, hospital authorities, and welfare workers. It is easy enough to send a parcel of books to a hospital; it is less easy to fit the reading to the state of the patients, and to select books so that they may alleviate, amuse, or stimulate, as the need may be. In countless instances the mind of a patient can be relieved by the right book at the right moment; this is especially the case with interrupted studies. There are many incidentals of the work, such as unpacking, rebinding, cleaning, mending, listing, and packing, all important to the successful working of the scheme. Those who are doing this hospital library work would welcome inquiries and constructive criticism. Correspondence may be addressed to the secretary at 48, Queen's-gardens, Lancaster Gate, W. 2.

REDUCTION OF FRACTURES.

THE first essential in the treatment of a fracture is its reduction, and this will often test the skill of the most experienced. Some form of traction is necessary, and during the last few years many surgeons have been considering what is the best way of applying it. Lorenz Böhler, of Vienna, has drawn attention to the value of pin-traction as a means of reducing, and maintaining the reduction of, fractures of a long bone. In fractured femur, for instance, a steel pin is passed in and out of the limb, through two skin punctures, and transfixes either the shaft of the femur below the fracture or the tibia below the anterior tuberosity; to the ends of the pin a steel stirrup is attached, and from this last a traction cord passes to a pulley and weight. The use of Kirschner's wire is lending this method a remarkable simplicity and precision. Recently a valuable contribution to the technique of fracture reduction has been made to the *Journal of the American Medical Association* (May 17th, p. 1547) by Robert Soutter, of Boston. The method is to increase traction gradually, under an anæsthetic, to an amount that will in 15–30 minutes relax the muscles enough to make reduction fairly easy. The traction is facilitated by an apparatus consisting of a rod 80 inches long bent at right angles at one end. The figure which we reproduce from the *Journal* shows the method of reducing fractures of the humerus and elbow.

"At the end of this right angle is a hook and at the other end of the rod is a hook. The rod is made up of several pieces, so that it may be taken apart and put in a small case. Each section is about 20 inches long. It is made of tubular steel and not of iron piping, as the latter does not stand the strain. Each tube is fastened to the next by a steel rod which is inserted in the tube. The steel rod should not bend and should be very strong. There are two webbing straps 46 inches long and 3½ inches wide with a heavy steel ring in each end. The webbing should be strong and double, and the ring should be stitched solidly so that the stitching will not rip. There is a spring balance that will measure 100 pounds, and there are two double block pulleys



with heavy cord. These block pulleys are 3 inches long and 1½ inches broad, and there are rings for hooks at each end."

Unbleached calico is used for making a Delbet knot for traction at the wrist or ankle in fractures of the upper or lower limb respectively; or at the ankle, instead of this knot, loops may be employed of heavy webbing 1 inch broad and 5 feet long made of three thicknesses stitched firmly together. The ankle and foot are encased in thick felt and the webbing is applied over it in the form of a figure of eight.

On the average traction begins with 10 lb., increasing at three-minute intervals to 20 or 25 lb., at which it remains for 15 to 30 minutes. The maximal traction in some cases is 15 lb., while in others, especially fractures of the femur, it may be 50 lb. or more; the amount is measured by a spring balance. At the end of the indicated time there is muscle relaxation lasting five to seven minutes, and during this period the fragments are manipulated into position with or without the maintenance of traction. If reduction is unsuccessful then the maximal traction is applied again for five or ten minutes more and another attempt made. When reduction is effected full traction is applied until the controlling splint is fixed; after this the traction is diminished—for example, when Thomas and sheet metal splints

have been securely applied to the leg the traction need not be much more than 10 lb. In summarising his views on this mode of treating fractures Soutter says that the difficulty lies not so much in the reduction as in the ability to wait patiently for the proper length of time before manipulating the fracture. He holds that many fractures which cannot be reduced by the usual methods will respond to this technique.

TUBERCULOSIS IN AMERICAN CHILDREN.

A GROUP of four articles reprinted in book-form [1] from the *American Review of Tuberculosis* for October, 1929, deserves attention. The first is by E. L. Opie, H. R. M. Landis, F. M. McPhedran, and H. W. Hetherington, who describe the widespread incidence of tuberculosis in childhood and discuss the difference between children who may profitably receive treatment to prevent further development of tuberculosis and those, who, though infected, require no treatment. In the second article the same authors describe a survey undertaken in the attempt to determine the prevalence of tuberculous infection in school-children. It gives a full account of tuberculin results and X ray findings in children of different races and ages. The incidence of the tuberculin reaction increases from birth till adult life. The third article, by H. W. Hetherington, describes the organisation of open-air schools for the treatment of tuberculous children, and the fourth article, by F. M. McPhedran, deals with the diagnosis and classification of pulmonary tuberculosis in childhood and adolescence, and concludes with 44 excellent plates showing X ray appearances reproduced by an adaptation of the aquatone process. The usual clinical examination is not sufficient to discover what children need protection against tuberculosis, and the authors show the importance of other methods, such as tuberculin and especially X rays, without which no examination is complete. The work is one of considerable importance and will be much appreciated by those interested in the diagnosis, treatment, and public health aspects of tuberculosis.

INSTRUCTION ABOUT DIET.

THE fundamental truth that man's body is built up largely of his food has always been easily apprehended, and the notion that its quality and quantity can influence his development and maintenance has been pondered over and taught about by philosophers, prophets, and law-givers as far back as history records. Mr. Walter de la Mare has pointed out that "It's a very strange thing, as strange as can be, that whatever Miss T. eats, turns into Miss T." But what interests her parents, guardians, or medical advisers is the effect it has on her in the process. This is not at all easy to ascertain. The adaptability of living matter to obvious changes in the food-supply, its failure of adjustment to quite obscure changes, and its individual variation in responding to changes of any given kind, make it very hard to discover a definite relation between the character of the food eaten and the health of any particular person. It is true that much has been done of late years to shed light on the complicated problems involved. Careful experiments on animals have taught us to appreciate the value of certain foods and food constituents and, in a few instances, controlled observations on large groups of human beings have yielded definite results leading to similar conclusions. It is easy to be impatient of this tedious method of arriving at the truth and, impressed perhaps by a few casual observations, one may feel called upon to expound principles of nutrition which not only have no scientific backing but may even have been proved contrary to demonstrable facts. If any useful purpose is to be served by wholesale propaganda in favour of food reform it is essential that any definite recommendations made should be supported by clear evidence that they are fundamentally desirable. A pamphlet on children's diet, recently published by the Food Education Society, illustrates the difficulties of broadcasting practical advice concerning the choice of food for children. Some of the advice contained in the leaflet is without question of real importance, as for example the warning against too exclusive a use of sugars and starches, the encouragement of a more liberal consumption of vegetables, salads, and fruit, and training in good habits of mastication. But in many respects the advice given must prove puzzling to those who are acquainted with the established principles of nutrition. The impression is given, for instance, though perhaps not intentionally, that milk is not merely unnecessary for young children but positively harmful. Meat is considered almost a poison, and meat soups, gravies, and extracts are even more dangerous, because they are said to contain the concentrated poisons of animals. It is suggested that children should rely on cheese, eggs, and nuts for their necessary protein though even eggs are to be used only in moderation. Bananas are stated to be responsible for a great deal of digestive disturbance and milk puddings should be barred from every table. That children may apparently thrive under such régimes no one need doubt, for it is known that men can be reared on diets of extraordinary diversity. The education of the public to realise that the nature of the food given to a child may determine the perfection of his physical development and his reactions in after life to disease-producing agencies is an estimable object. It cannot be too strongly emphasised, however, that for such propaganda to have any enduring success it must be based on facts which can be scientifically proved and must be as free as is humanly possible from any taint of prejudice.

PUBLIC HEALTH IN SHANGHAI.

THE report of Dr. C. Noel Davis, commissioner of public health of Shanghai for the year 1929, has just appeared, and is a document of real interest. Indeed the Shanghai Medical Society, upon its publication, has placed on record its high appreciation of the activities of the public health department of the Shanghai municipal council. But the honorary secretary of the Society, Dr. H. Cooper Patrick, in sending the findings of a subcommittee of the Society presented to the annual meeting some two months ago, indicates that it is only the position of State medicine that is satisfactory to the Society, for otherwise the medical profession suffers in Shanghai from heavy professional drawbacks. The report of the subcommittee of the Society emphasises the mischief done through the licence enjoyed for medical practice by persons who are not registered as qualified practitioners in their own country. At the present their practice and professional status seems unaffected by the absence of proof that they are doctors. The Society therefore suggests that a board of medical registration should be formed with the duty to issue licences to those properly qualified to practise in the Settlement, and that similar registration restrictions should also be required for pharmacists. It is almost a direct sequel to such resolutions that the Society should also insist on the standardisation of teaching schools, especially those attached to hospitals. These resolutions are in accord with recognised developments of medicine in civilised countries, and the suggested reforms would follow along the indicated lines. The Shanghai Medical Society enjoys a good professional position and membership is open to all properly qualified medical practitioners recognised as such in their own country. It has existed nine years, its presidential chair has been occupied by members of American, British, Chinese, and French nationalities, and its proceedings should assist the undertakings of the League of Nations in international

[1] Tuberculosis in Public School Children. By Various Authors. From the Henry Phipps Institute of the University of Pennsylvania under a grant from the Metropolitan Life Insurance Company. Pp. 223.

hygiene. Dr. Noel Davis's report calls particular attention to the epidemics during the year of cerebro-spinal fever, which was reported in Shanghai in March, and cholera which appeared in September in a severe form, though with a lower mortality than had characterised previous outbreaks. In this connexion he makes reference to the visit paid at the end of the year by Dr. Rajchman, Director of the Health Section of the League of Nations, finding it "impossible to estimate too highly the achievements of the League in the cause of international science." Dr. Rajchman was accompanied by Dr. Boudreau, and they took part in an interesting discussion with a number of Chinese and foreign officials, having for its object the prevention of cholera and other communicable diseases in Shanghai. The statistical summary, derived from an interesting report, justifies Dr. Davis's optimistic outlook.

UNDULANT FEVER IN MALTA.

THE paper by Sir Themistokles Zammit and Dr. J. E. Debono, which we publish on another page, comes as a rude reminder of the fact that although the labours of the Mediterranean Fever Commission of 1904–05 removed, for all practical purposes, the dreaded undulant fever from the medical history sheets of the Services, the civil population of Malta, left to work out its own salvation, still suffers as heavily as ever. From the most recent report on the health of the Maltese islands we learn that in 1928 undulant fever headed the list of notifiable infectious diseases, with a total of 962 cases and 42 deaths among the total population of 230,618. As the bulk of the cases involve young adults, the problem is a serious one for industry as well as for the public health authorities. It is now generally accepted that in at least 70 per cent. of the cases the disease is conveyed by milk derived from goats infected with *Bacillus melitensis*, and it is equally clearly established that the infectivity of the milk can be readily destroyed by boiling or even by efficient pasteurisation. It is difficult, therefore, to understand why the disease has not been stamped out from the Maltese islands during the interval (now a quarter of a century) that has elapsed since the findings of the commission were made known, and why no attempt has been made to cope with the situation either by the adoption of palliative measures such as compulsory sterilisation of the milk, or measures based upon the Bang process for the eradication of the infected animal—practical proposals which were made by Dr. John Eyre in a report upon the work of himself and his colleagues in 1906. The answer to these questions undoubtedly is that local conditions, only too familiar to those who have worked in Malta, coupled with lack of financial support, have stultified the efforts of the public health department in dealing with the infected milch goat. It is true that Zammit, who has never allowed his ardour in the study of *melitensis* infection to lessen, has from time to time aroused the sympathetic attention of various authorities, but in the past lack of funds has operated adversely toward his endeavours. His present investigation, however, appears to have received material support from the Legislature of the island, and the results he records, though by no means conclusive, suggest that he has achieved a measure of success. His attempts at cuti-immunisation form a logical corollary to Besredka's claims, and if these latter are based on solid foundations, it may well be that modifications in technique will enable Zammit to confer a lasting benefit upon his fellow-countrymen. Incidentally his observations bring out a disquieting but very important point—namely, that certain animals, though proved by post-mortem examination to be heavily infected, fail during life to show what has hitherto been regarded as the cardinal sign of infection—i.e., specific agglutinins in the blood serum. This observation is one that demands further and fuller investigation, because if it holds good to any marked extent it must greatly increase the difficulties of prevention.

STREET ACCIDENTS.

THE note on street accidents in Bremen (see p. 1362) by Major P. G. Edge, of the London School of Hygiene and Tropical Medicine, raises an interesting question. Major Edge points out that the allocation of responsibility for traffic accidents made by the Bremen authorities contrasts glaringly with that established here with respect to *fatal* accidents, and suggests that a concentration of attention upon the latter may give us an incorrect view of the ætiology of a disease which claims thousands of victims. Some of the most fruitful work of the Industrial Health Research Board has been based on the study of trivial accidents, has established the importance of individual psychological factors, and has gone some way towards the differentiation of the temperamental types prone to accident. It is probable that these results may be generalised and that there are now in legal control of masses of steel capable of being hurled through our streets at high velocity many persons not only unfit to shoulder such a responsibility, but not capable of discipline by legal sanctions. Evidently the first step towards real knowledge is a more precise analysis of a sample of the facts than has yet been published. Major Edge makes some valuable suggestions. In addition to these we think some use might be made of car insurance data. The companies presumably now possess extensive particulars of accidents of all degrees of gravity. Is it too much to hope that this experience will be used? An analysis of such data by a scientific committee containing medical, psychological, statistical, and engineering experts should be illuminating. It may be true that a mere test of proficiency, even if administratively practicable, would be but a poor safeguard; yet the contrast between the stringent conditions imposed upon would-be amateur aeronauts and the free trade in terrestrial locomotion is curious. That the only guarantee of fitness our laws demand of a raw lad, before he is allowed to bring out upon a crowded highway a ton and a half of machinery, capable of passing from rest to a velocity of 60 miles per hour within a few seconds, is his ability to write his name and pay a sum of 5s., may seem to a future generation at least as monstrous as any of the savage customs of our ancestors.

VARIABLE RESPONSE TO INSULIN.

IT is a common observation that some diabetic patients vary from time to time in their reaction to similar doses of insulin, even in the absence of complications, such as infections, which tend to aggravate the disease. Karelitz and co-workers [1] have recently investigated the suggestion that this variability in response to insulin is due to the presence in the diabetic patient's blood of some substance which neutralises or inactivates insulin. They find that insulin, after incubation with blood plasma obtained from a diabetic patient, loses its power to produce hypoglycæmia in rabbits. Intact corpuscles give indefinite results, but laked corpuscles possess the same property of inactivating insulin to an even greater extent than plasma. Control experiments in which saline solution, agar-agar, and egg albumin are substituted for blood yield negative results, and such changes as occur in the pH of the incubated mixture are insufficient to explain the phenomenon. It is, however, a significant fact that normal blood possesses this same inhibiting action on insulin, although in much smaller degree. It is difficult to assess the importance of these results, since eight years of research following the isolation of insulin have failed to reveal either the structure of the hormone or the way in which it exerts its profound action on carbohydrate metabolism. Further control experiments seem desirable, for such a mixture of substances foreign to the rabbit as human blood

[1] Karelitz, S., Cohen, P., and Leader, S. D.: Arch. Int. Med., April, 1930, p. 546.

might well provoke reactions which would quite indirectly interfere with the action of insulin. Such a possibility could be excluded by observing the effect on the rabbit's blood-sugar of blood and insulin, incubated separately and injected simultaneously. A. A. Epstein and N. Rosenthal believe that in diabetes changes in the permeability of the vessels permit trypsin to leak into the blood stream, where it antagonises insulin. But it is difficult to believe that we are dealing with trypsin, for normal as well as diabetic blood possesses this property.

These experiments, at present, do no more than confirm the impression that the action of insulin involves a very complex type of chemical reaction.

INTERNATIONAL STANDARDISATION OF COLOUR VISION TESTS.

FOLLOWING on resolutions passed by the Scandinavian Ophthalmological Congress, the subject of international standardisation of colour vision tests has been considered by the International Labour Office at Geneva. A report on the subject, prepared by Prof. Oscar Oblath, of Trieste, has now been translated into English.[1] Of the tests in general use, Holmgren's wool test is found to be an inadequate test of fitness for the railway service, on the grounds that the large size of the test objects allow those with a central scotoma to pass, and that the saturation of the colours makes the test too easy for the detection of the slight defects. The most efficient test for examining on a large scale is declared to be Stilling's pseudo-isochromatic diagrams as revised by Hertel and published by George Thieme, of Leipzig (1926). In this test, on a background composed of colour spots of different sizes, numerals are marked out in spots of the confusion colours. Railway candidates, it is said, should be able to pass two of the most rigorous tests. The anomalascope of Nagel is a test in which the candidate has to mix a measured amount of red and green lights until they match a constant yellow, and for scientific purposes a quantitative test of this sort is desirable. Edridge-Green's lantern—the test employed by the Board of Trade in this country—is acknowledged to be efficient in the hands of a competent examiner, but the fact that in this test the colours have to be named by the candidate is regarded as a disadvantage; it must be noted that Dr. Edridge-Green himself claims this as an advantage, since in actual life the engine-driver (for instance) has to name the colours to himself in order to distinguish them—a point of view endorsed by Sir John Parsons.[2] In view of the fact that a considerable number of railway accidents and disasters at sea have been proved to have been due to defects of colour vision, the importance of the subject is evident. The report recommends that every Government should establish regulations specifying which employees in the transport services, whether by land, sea, or air, ought to be subject to an examination of their colour vision, and stating precisely the methods to be used in the examination and the manner in which they ought to be applied. Uniform regulations for all countries is the ideal, but, short of that, each country should have a definite legal enactment applicable to all the services concerned.

[1] Geneva, 1929. London: P. S. King and Co. 2s.
[2] Diseases of the Eye, fourth edition, p. 381.

TREATMENT OF EARLY NERVOUS DISORDERS.—The Sussex County Hospital at Brighton is preparing to open in the autumn a department for the treatment of early nervous disorders, and Dr. Helen Boyle and Dr. George H. Harper-Smith have been appointed honorary medical officers. It will be a consultative out-patient department and will be worked in coöperation with the Lady Chichester Hospital, Hove.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdr. K. D. Bell is placed on retd. list with the rank of Surg. Capt.

Surg. Lt.-Comdr. (D) F. W. Watt is appointed to the *Victory*, for R.N. Barracks, Portsmouth.

ROYAL ARMY MEDICAL CORPS.

Lt.-Col. (temp. Col.) D. S. Skelton, from R.A.M.C., to be Col.

Lt.-Col. E. Bennett retires on retd. pay.

Lt. A. R. Cowan relinquishes his temp. commn.

ARMY DENTAL CORPS.

Capt. H. F. Byrne to be Maj.

ARMY RESERVE OF OFFICERS.

Maj. A. W. A. Irwin, having attained the age limit of liability to recall, ceases to belong to the Res. of Off.

MILITIA.

Maj. J. R. R. Trist retires on attaining the age limit and is granted the rank of Lt.-Col.

TERRITORIAL ARMY.

A. S. Henderson to be Lt.

ROYAL AIR FORCE.

H. R. Clein is granted a short service commission as a Flying Officer for three years on the active list.

Flight Lt. R. Boog-Watson is promoted to the rank of Squadron Leader.

Maj.-Gen. W. R. Blackwell, late R.A.M.C., has been appointed Hon. Surg. to the King, vice Maj.-Gen. H. P. W. Barrow, late R.A.M.C. (ret.).

ROCKEFELLER MEDICAL FELLOWSHIPS. — These Fellowships are awarded to graduates who have had some training in research work either in the primary sciences of medicine or in clinical medicine and surgery, and who are likely to profit by a period of work at a chosen centre in America or, in special cases, in Europe, before taking up positions for higher teaching or research in the British Isles. The Medical Research Council announce that on behalf of the Rockefeller Foundation they have appointed the following graduates to Travelling Fellowships for the academic year 1930–31: Russell Claude Brock, F.R.C.S., of Guy's Hospital; Frank Burnet Byrom, M.R.C.P., of the London Hospital; Desmond Curran, M.R.C.P., of the Hospital for Epilepsy and Paralysis; Alan Aird Moncrieff, M.R.C.P., of the Hospital for Sick Children, Great Ormond-street; Arthur Spencer Paterson, M.B., Assistant Physician to the Royal Glasgow Mental Hospital; and Charles Cady Ungley, M.R.C.P., of the Royal Victoria Infirmary, Newcastle-on-Tyne.

Dr. Moncrieff's Fellowship is tenable at Hamburg; the others at centres in the United States. Mr. Brock and Dr. Curran have been appointed on modified conditions while receiving emoluments from other sources.

HOSPITAL ACCOMMODATION IN DORSET.—The Duke of Somerset last week opened an extension of Shaftesbury Hospital which provides four additional wards, two public and two private, containing 12 beds. The extension, which has been necessitated by the growth of the Hospital League, which has brought more patients, and the increase in motoring accidents, has cost nearly £5000.—At a conference between the Dorset public assistance committee and representatives of the voluntary hospitals of the county, it was stated that there are ten voluntary hospitals in the area. They contain a total of 394 beds, 67 of them for children, and 22 for maternity cases. In 1929 they treated 5350 in-patients, an increase of 1146 since 1927, of which 221 were maternity cases. The Cornelia and East Dorset Hospital, at Poole, with 105 beds, is the largest in the county, and last year it treated 1369 in-patients and 105 mothers. It was suggested that the 393 sick and infirm now under the care of the public assistance committee in 11 different institutions might be concentrated in from four to six infirmaries, but no recommendations were made.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles Contributed by Invitation.

LXXVII.

INTERPRETATION OF BLOOD FILMS.

MEDICAL diagnosis is a kind of speculation that should, so far as possible, be founded on facts. The interpretation of a blood film as an aid to diagnosis is in this respect twofold. The facts are dependent upon an accurate recognition of any morbid changes which may be present; the speculation is the application of these facts to the clinical condition of the patient. It must be insisted at the outset that an accurate description of a blood film requires a long and very special training, and that the information afforded by a film alone is rarely sufficient for a diagnosis, and never equivalent to that provided by a complete blood examination. It is often possible, however, from the preliminary examination of a blood film to decide if a complete blood count is necessary or not, and, provided that the pathologist is given some clinical account of the patient, data bearing upon the diagnosis are frequently available.

PART I.*—THE RED CELLS.

In the stained film preparation alone we have only to consider the three formed elements of the blood, the red cells, platelets, and white cells. The red cells may vary in number, size, shape, staining reaction, and maturity. The film gives little or no indication of the number of red cells present to the cubic millimetre. Deviation from the normal size can be estimated from a dried film, since the shrinkage of the red cells in the process of drying and fixation does not vary widely in different preparations.

Variation in Size.

Marked variation in the size of the red cells present is usually associated with alteration of shape (poikilocytosis), and may be found in any form of anæmia. Such cells may be pear-shaped or otherwise distorted, and these appearances can be distinguished from simple crenation or the effects of undue pressure in making the film. These changes are only very exceptionally present with a high red cell count, and are most extreme in pernicious anæmia, where they may occur before any serious diminution in the number of red cells has taken place. In the rare condition of aplastic anæmia alterations in size or irregularity in size (anisocytosis) occur without alteration in shape, the majority of the abnormal cells being small. In pernicious anæmia the average diameter of the red cells is above the normal, and this increase of size is a valuable diagnostic feature, since in the majority of secondary anæmias the average size of the red cells tends to be below normal. The megalocytosis is usually sufficient to be recognised without direct measurement by the experienced observer, but in case of doubt actual measurement is advisable.

Depth of Staining.

The depth of staining of the red cells gives a fair indication of the amount of hæmoglobin they contain; pallid cells with a large and colourless central area are suggestive of a considerable degree of anæmia. The percentage of hæmoglobin cannot be even approximately estimated, but it is usually possible to tell from the film alone whether there is a grave hæmoglobin loss or not.

Polychromasia.

A purple tinting of the red corpuscles with Leishman's stain, or *polychromasia*, is never general, and the proportion of cells so affected is an indication of the number of immature cells. Wrinkled, polychromatophilic cells are frequently reticulocytes, and are numerous in certain phases of pernicious anæmia, but are seen in other states and are most abundant in the relapses of hæmolytic icterus. The absolute recognition of reticulocytes requires a special staining process for the reticulum which is not effective in a dried film. Polychromasia is always present in films showing any marked degree of poikilocytosis and in all nucleated red cells. Generally speaking, it may be said that changes of shape, size, and staining reactions vary together and indicate the same process—namely, the reaction of the red marrow to red cell destruction. Complete absence of these changes negatives any severe form of anæmia (with the single exception of aplastic anæmia), their presence varies with the severity of the anæmia, being most extreme in untreated pernicious anæmia and least evident in the milder secondary anæmias.

Granular Degeneration.

Stippling of the red cells, or granular degeneration, is a condition in which the red cells are found to have a powdering of fine bluish granules through their cytoplasm. This change may occur in primary and, to a less degree, in any form of secondary anæmia; it is rare, however, to find granular degeneration in any considerable proportion of the cells or in a coarse and obvious form in any other condition than acute lead poisoning. Red cells showing this change may be present in lead workers without actual symptoms of poisoning, but they may be absent in chronic cases, even when colic or palsy have occurred, and as evidence of lead absorption are not so dependable as the presence of a blue line on the gums or lead in the urine. In acute lead poisoning stippled cells are in the degree in which they are usually found, almost diagnostic of the condition and may afford the first clue to the diagnosis.

Normoblasts and Megaloblasts.

Nucleated red cells are entirely absent from the peripheral circulation in normal adult life. In childhood nucleated red cells are present at birth, and may reappear in the circulation in response to mild stimuli. The interpretation of the blood film in children under 8 years of age must always be undertaken with the understanding that the cellular elements are far more subject to fluctuation than in later life, and that primitive cells may appear in considerable numbers in almost any trivial disorder. In the adult even the finding of a single normoblast is of significance, and the presence of megaloblasts may be of serious import. The distinction between normoblasts and megaloblasts is necessary owing to the different conditions associated with the appearance of these two cells in the peripheral circulation. The histological differences are mainly in the nuclei, less in the relative sizes of the cells. The normoblast is a dead cell with a deeply and evenly staining or "pyknotic" nucleus, the megaloblast—in its more primitive form—is a living cell with a peculiar stippled network in the nucleus. The normoblast may appear in any secondary anæmia, such as that consequent to hæmorrhage, provided the blood loss is severe. The megaloblast is only found in a limited number of serious disorders. It is a diagnostic feature of pernicious anæmia, but occurs also in the severe anæmia of the puerperium, in myelophthisic anæmia, in the leukæmias, and in the small group of disorders associated with a pernicious anæmia blood state, including the anæmia of sprue and poisoning by arseniuretted hydrogen. In these anæmias, as in pernicious anæmia, a tentative diagnosis may be hazarded from the blood film alone, the chief points being advanced alterations of shape and staining reaction of the red cells, an increase in the average size, the presence of megaloblasts even in very small numbers, and, in addition, an apparent leucopenia with a relative lymphocytosis. In the anæmia of cancer, associated with secondary deposits in the

* Part II., on the White Cells, will appear next week.

red marrow—myelophthisic anæmia—there may be no noteworthy blood changes, but more frequently the changes are extreme, and the film alone may be almost diagnostic. The chief features are the presence of nucleated red cells, both normoblasts and megaloblasts, in numbers approaching that of the white cells, extreme changes in shape, size, and staining reactions, and the appearance of occasional primitive white cells. The general appearance of the film may be indicated by the confession that it is the preparation one usually demonstrates to students, as from a case of pernicious anæmia, a disorder in which these changes are all present but never to this degree. The average size of the red cells is, however, small, and the blood count reveals a low colour-index.

Parasites.

The examination of a blood film for the parasites of tropical diseases is scarcely within the scope of this article, but the identification of the malarial plasmodium may be mentioned, since it not infrequently happens that they are met with unexpectedly in an obscure case of fever. The parasites are recognised within the red cells in a Leishman-stained film by their blue staining cytoplasm, purple chromatin, and dark pigment granules. In the more usual forms in which they appear in blood films taken in this country the benign tertian parasite occupies an enlarged red cell without filling it; the quartan form usually occupies the entire area of a red cell of normal size, the malignant tertian parasites are usually very scanty, and appear as signet rings and crescents.

Blood-platelets.

The blood-platelets are readily recognisable objects in the stained film, and the only diagnostic information which they yield results from an enumeration of them. An accurate platelet count is completely upset after the blood is shed and clumping of the platelets has taken place, but the film is a fair guide to any gross change of number. The most extreme diminution of the platelets is found in the purpura of essential thrombopenia, and there is an evident loss in aplastic anæmia. The finding of abundant platelets in films from suspected examples of either of these two conditions would negative the diagnosis. The platelets appear in the films in increased numbers and in large clumps in a variety of clinical states, including the chronic leukæmias and the acute inflammations. These increases, however, are accompanied by other and more readily diagnostic changes in the leucocytes.

Summary.

Briefly, the chief points to examine for in the red cells of a stained film are those alterations of shape, size, staining reaction, and nucleation which indicate red cell loss and its normal sequel—red cell regeneration. Anæmia, in its milder forms, can only be recognised by a red cell and hæmoglobin estimation. The red cell changes of the more severe anæmias can nearly always be detected in the stained film, and some indications can usually be made out of the nature of the anæmia. The film, at any rate, will frequently direct us to the necessity of a fuller blood examination.

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MILLER GENERAL HOSPITAL.—The annual report of this hospital for South-east London records a financial crisis and describes how it was temporarily surmounted. Towards the end of last year the position became so critical that it was feared that a large part of the hospital would have to be closed. An appeal through the press was fruitless, but the crisis was averted by the grant by King Edward's Fund of £12,000 from the Thankoffering Fund. The year's expenditure exceeded £38,000 (151 beds were in use), as against £33,000 in 1928, when the average number of beds available was 136, and there was a deficit of £3781. The in-patients numbered 2200, an increase of 166; their average stay was 22·93 days. The new out-patients received in the various departments numbered 31,124, also a substantial increase.

Special Articles.

STREET ACCIDENTS.

BY P. GRANVILLE EDGE, O.B.E., F.S.S.,
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FOR some years the number of deaths caused by mechanically propelled vehicles has been increasing at about the same rate as the number of licensed vehicles. Between 1922–23 and 1928–29 the number of licensed vehicles increased from rather fewer than 1,000,000 to slightly more than 2,000,000. In 1923 2414 persons were killed in England and Wales; in 1928 the number was 5196. The price to be paid for the convenience and pleasure of motor transit is, it will be seen, a trifle heavy, and the industry and ingenuity of official statisticians are taxed to set out the information in the most illuminating way. Our own authorities are very energetic, but a recent report of the municipal authorities in Bremen[1] suggests some lines of inquiry which might be profitably followed here. The Bremen statisticians have gone to work with teutonic thoroughness; their records enable street accidents to be classified by hour, day, and month of occurrence and kind of vehicle or vehicles involved; they show whether the accident was due to mechanical defects in the vehicle, or to negligence, errors of judgment, or other faults on the part of the driver or pedestrian; whether the accident involved collision with roadside obstructions; degree of severity of injury received—slight, severe, or fatal, &c. (So complete are the particulars that it is curious to find neither the age nor the sex of persons killed or injured tabulated.)

The Bremen Data.

When attempting any examination of these records it is to be remembered that the Bremen data have reference to street accidents of all kinds, whether resulting in personal injury or deaths, or merely damage to vehicle or property. Such wealth of published information is not usual in our own country, where the tendency prevails of only publishing statistics of the numbers of persons killed or injured as the result of such accidents. It is a pity that some of the tabulations are not readily intelligible, still the general results are interesting.

It appears that street accidents in Bremen during 1929 showed an increase of 27 per cent. over the figures for 1928, largely due, no doubt, to the increased volume both of vehicular and pedestrian traffic during the period, since motor vehicles of all kinds had increased by over 30 per cent. in 1929, motor-cycles by 51 per cent., pedal cyclists by 34 per cent., pedestrians by 29 per cent., while other traffic showed percentage increases varying from 9–16 per cent.

The distribution of these accidents by month of occurrence reveals that during 1928 fewer accidents occurred during January than in any other month. In February, however, the figures were almost doubled, and thereafter followed a steady and continuous rise each month, with a further considerable increase during the month of July, when the peak of the accident curve was reached. In 1929, February was the month of fewest accidents, followed by a slight rise during March, and then a rapidly rising tide to the end of May; during June and July accidents were fewer—a rise in August—the peak being reached during the month of September. These differences may be attributed in part to the fact that while the summer and autumn of 1928 were

[1] Die Strassenunfälle in der Stadt Bremen. 1928 und 1929. (Bremen Verwaltungs-und Wirtschafts-berichte. Heft 1. January, 1930.)

generally wet, cold, and discouraging to the majority of pleasure-seekers, those seasons during 1929 enjoyed high temperatures and fine weather—conditions favourable to increased use of road traffic by tourists and others. When the data are further analysed to discover the accident incidence by days of the week, Saturday produced by far the greatest number of street accidents, with small peaks on Tuesdays and Thursdays, Sunday appearing a comparatively innocent contributor. No exact comparison can be established with the figures for London, but if the numbers of ambulance calls (street accidents) each day are tabulated, it may be seen that in London (as in Bremen) Saturday is unquestionably the most dangerous day of the week, Sunday the safest; curiously enough, the smaller peaks in London are Fridays and Mondays (week-enders?) and Wednesdays, the latter probably having some close correlation with early closing in provincial areas.

Daily Incidence of Accident.

The characteristic features of the incidence of street accidents tabulated daily by hour of occurrence in London and Bremen seem to be as follows:—

(*a*) In Bremen there is a steady rise between 11 P.M. and 2 A.M., though in London there is a decrease in the numbers of such accidents between 11 P.M. and 5 A.M.

(*b*) At 6 A.M., in both cities, the tide of increase definitely asserts itself, and continues to mount—in Bremen until 2 P.M., in London there is a noticeable falling-off between 9 A.M. and 11 A.M., then continuing to rise to 2 P.M.

(*c*) Between 2 and 3 P.M. a falling-off in both cities.

(*d*) Between 3 and 5 P.M. a rise in both cities, though less marked in London.

(*e*) 5 to 6 P.M. decrease in Bremen, followed by rise 6 to 7 P.M. 5 to 7 P.M. sharp rise in London.

(*f*) Between 7 and 11 P.M. in Bremen and 7 and 10 P.M. in London numbers rapidly decrease; but in London between 10 and 11 P.M. accidents again show a tendency to increase.

(*g*) Between 11 and 12 P.M. Bremen street accidents again show an upward trend, though in London during the same hours a falling-off is noticeable.

Not the least informative and useful tables are those wherein street accidents are tabulated (*a*) by district or ward of occurrence, and (*b*) according to cause. In the first of these it may be seen that Districts 1, 3, and 9 are the sites within whose boundaries the majority of these events occur—indeed, No. 1 District produces approximately 28 per cent. of the annual total of the city of Bremen; it is not without interest to note that Districts 1 and 3 are situated in the old town (*Altstadt*) with its narrow winding streets, while No. 9 District occupies the extensive dock and commercial areas of the city—all three districts on the right bank of the Weser; suburban extensions surround these areas, and include Districts 10–25, which show the lowest street accident rates recorded in Bremen. In regard to (*b*) above, "causes" are tabulated according to whether the accident was deemed to have been due to mechanical defects in the vehicle (brakes, steering, illumination, &c.), faults or negligence on the part of the driver (fast driving, driving on wrong side, cutting-in, &c.), faults of pedestrians (carelessness, &c.), and unavoidable accidents.

In this table (*b*) appear striking features worthy of comment. The Bremen data assert that over 50 per cent. of all street accidents are due to *faults on the part of the driver of the vehicle*, and between 9–11 per cent. to faults of pedestrians. Compare these rates with those of London; for the past few years, and certainly for the years 1928–29, pedestrians have been held responsible for approximately 50 per cent. of all *fatal* street accidents; official figures for the first three months of the present year assert that of 320 fatal accidents in the streets of London no less than 155 (or nearly 50 per cent.) were due to the carelessness of pedestrians.

Dead Men Tell No Tales.

Since there is no obvious reason to suppose that German drivers are less efficient than English motorists—some of whom, at least, are not *very* cautious—one is led to wonder whether the contrast may not be sufficiently explained by the adage that dead men tell no tales. After all, the most savage of motorists is not deliberately seeking the blood of his fellow creatures; his word is likely to be favourably received, and the victim is silent. The Bremen publication suggests a valuable statistical experiment. It is obvious that such elaborate details of the accidents in the whole metropolis could not be published; but there seems no reason why a sampling experiment should not be done, why typical streets of different types should not be chosen, and a complete enumeration on the German lines be published. There was a time when the motorist was the scapegoat of the community. He was preached at and fined with monotonous regularity. Times have changed; now it is the (surviving) pedestrian who is monotonously warned that "many of the fatal accidents could have been avoided by the exercise of a little care"—a truth of undoubted weight, of course, but neither new nor helpful. Just as in more technical medical statistics we need records of cases of disease as well as of deaths, here we need more information about non-fatal accidents in order to understand the ætiology of the disease of speed.

THE SHEFFIELD HOSPITALS CENTRE.

A STUDY OF CO-OPERATIVE MOVEMENT.

SCHOOLS of medicine in this country as a rule began either as the private enterprise of some individual medical man or as a joint foundation by the members of the staff of some hospital. Most of the latter still remain, and the connexion between the hospital and its medical school in many cases still remains as intimate as it was originally. This is especially so in London where the various medical schools, although part of the university, are primarily the adjunct of the hospital concerned and bear its name. In the provinces, on the other hand, wherever a medical school has survived, a local university has eventually been founded, and in each case the fusion between the old medical school and the young university has been of a more complete kind. In some places where the hospital originally connected with the medical school has for long predominated in size or remained the only large hospital in the locality, it has become the sole clinical hospital connected with the university. In others where more than one local hospital has earlier or later been recognised as a teaching institution, the university has become associated with more than one clinical institution for its medical students.

In many ways the single clinical institution is the more convenient. Arrangements for the supervision of the students are more simple; organisation of their work is more easy. On the other hand, there is something to be said in favour of multiple clinical institutions. They widen the student's outlook and take away the tendency to insularity which, though attractive in youth, may not be altogether the best for his later career. In Sheffield when the university took over the medical school, two general clinical hospitals were connected with it, and both have continued as places of instruction for its students. In speaking of single or multiple hospitals, it will be realised that with the gradual separation of various groups of cases (maternity, mental, fevers, tuberculosis, and even venereal diseases), there is a certain amount of multiplicity in clinical hospitals connected with every school.

At the present time there are four voluntary hospitals in Sheffield, two general and two special, and they are all attached to the university for teaching purposes, although there is no actual written agreement between the university and any one of them. By the terms of the University Charter, the Royal Infirmary and the Royal Hospital have a member of their staff on the council of the university, but the latter

has no official representation on the board of any of the hospitals. On the academic side the relations between the university and the hospitals are, and always have been, exceedingly close. Thus in addition to the purely clinical teachers, the professors of pathology, pharmacology, and physiology in the university are all members of the hospital staffs. In the case of pharmacology the professor is a full physician to the Royal Infirmary with his own beds and assistants, whilst the professors of pathology and physiology are respectively in immediate control of the clinical laboratories dealing with their particular subject at the various institutions. A short account of the origin of the voluntary hospitals and development will show how the present position has come about.

The Royal Infirmary.

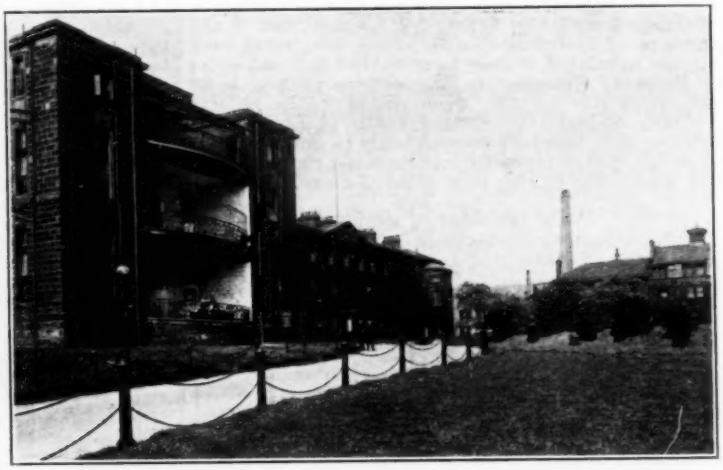
The first public suggestion that an infirmary should be established in Sheffield came from a medical man (Dr. William Younge) in a letter dated April 19th, 1792. As a result of this a public meeting was held in the town hall on April 23rd, the foundation-stone was laid on August 29th, and the General Infirmary was opened with much pomp and ceremony on Wednesday, Oct. 4th, 1797 (Fig. 1).

The first addition to the original building was made in 1847, the jubilee year of the infirmary. The financial position caused much anxiety, the invested funds had fallen from £20,000 to £12,000, and the weekly board spoke of the institution as "this deserving but decaying charity." In 1849 the board advertised for a nurse "who could read and write, or at least could read writing." For the next 20 years the financial position still gave rise to continual anxiety. This was relieved somewhat by the institution of a Hospital Sunday in 1868, and a Hospital Saturday in 1877. Additions to the original building from then onwards have had to be made at frequent intervals in order to cope with the increase of work.

In 1872 a detached block, consisting of four large wards and connected with the main building by a subway, was opened for "the isolation of contagious diseases and offensive surgical cases." In 1883 an out-patient building was built, equipped and opened. In 1887, in commemoration of the centenary of the infirmary, many additions were made, including a detached "home" for the nursing staff, ophthalmic wards, laundry, mortuary and post-mortem rooms. A new general theatre was also added, and the out-patient department was enlarged. In 1911 the exigencies of the growing population of the city and vicinity were met by the erection of another surgical block containing 215 beds. Again in 1921 alterations were made to existing buildings to increase the bed accommodation, and on August 8th, 1925, Princess Mary opened a new "ear, nose and throat" department, and in 1926 a new residency was opened (Fig. 2).

The number of beds available at the infirmary when it was first opened in 1797 was between 100 and 110. At the present time there are 500.

FIG. 2.



Sheffield Royal Infirmary, 1930. The original building is seen in the central part of the picture.

FIG. 1.

General (now Royal) Infirmary, Sheffield: the original building, 1797.

The Royal Hospital.

The present Royal Hospital began as a dispensary in 1832, occupying small premises in the centre of the town. The promoters (in this case a group of medical men) had previously approached the board of the General Infirmary suggesting that the dispensary should be attached to that institution. This, however,

was declined, chiefly through the active opposition of one of the latter's physicians. The work increased rapidly and the dispensary soon wanted larger premises. A house in West-street was bought, on and around the site of which the present building stands (Fig. 3).

It continued as a dispensary with little or no change for the next 25 years. In 1854 three physicians were

FIG. 3.

Westfield House, the Public Dispensary, forerunner of the Royal Hospital.

appointed. This election proved the turning-point in the future development of the institution. Owing to the energy and influence of the senior of the three, Dr. John Charles Hall, the dispensary was rebuilt as a hospital with 25 beds in 1860, and ten years later this was enlarged to 100 beds. It was now officially recognised as a teaching institution, and from that time onwards became connected with the medical school.

The work of the new hospital increased rapidly, so that in 1889 it was found necessary to rebuild on a larger scale. The first blocks of the present buildings were completed and opened in 1895 (Fig. 4) by His Majesty the King, at that time Duke of York, permission being given for the institution to be called the Royal Hospital.

In 1914 the present block of buildings was completed. Since then no actual new buildings have been erected on the site, but various means have been obtained to increase the accommodation. Thus in 1908 a convalescent home or annexe in the suburbs was given. Residential quarters have been obtained in the outskirts of the city for most of the nursing staff, and lastly, in 1925, a former chapel adjoining the hospital site was converted into a new out-patient department. As the hospital grew the dispensary dwindled, until, about the beginning of the century, it ceased entirely.

The Royal Hospital now has 340 beds.

Jessop Hospital for Women.

The foundation of a women's hospital in Sheffield dates from 1864. This again was largely due to the efforts of a medical man, Dr. J. H. Aveling, who took an active part in its work for some years. It was called the Sheffield Hospital for Women. A large house in the centre of the town was adapted for the purpose, situated in what had once been a residential quarter (Fig. 5). It consisted of six beds and an out-patient department. Fourteen years later in 1878, owing to the generosity of Mr. Thomas Jessop, the present hospital was built, and henceforward known as the Jessop Hospital for Women.

Since then considerable additions have been made to the original building in order to cope with increasing demands (Fig. 6). Outside accommodation has been obtained for the nursing staff. In 1926 Norton Hall, a mansion situated in a large park on the hills outside the city, was converted into an open-air annexe, partly for the treatment of cases of puerperal sepsis and partly for antenatal and gynæcological cases.

At the present time the hospital and the Norton annexe contain 145 beds for gynæcological, obstetrical, and antenatal cases. There are also extensive out-patient departments. The hospital is recognised for the instruction of medical students and midwives.

Children's Hospital.

This, the youngest of the four voluntary hospitals in Sheffield, was founded in 1876 by the activities of the late Dr. W. J. Cleaver. A few years later the present buildings in Western Bank were built, at which there is in-patient accommodation for 86 children together with an out-patient department. A new block of wards has recently been added and further additions are being made (Fig. 7). There is also an out-patient department in the east end of the city.

Medical School.

As the medical school was founded in 1828 it is thus seen that for the first 40 years of its existence there was only one clinical institution connected with it. From 1870 onwards there were two, which for the next ten years were rivals for the student's

FIG. 4.

Sheffield Royal Hospital, 1930.

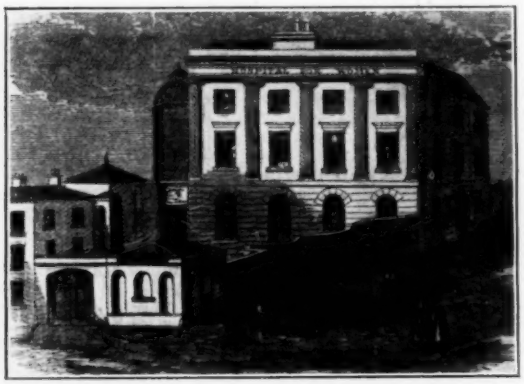
Photograph by Yates and Henderson.

favours. This was so unsatisfactory that in 1880 it was agreed by the staffs that the two should in future coöperate for purposes of clinical instruction, under the control of a committee composed of three representatives appointed from each. The student now paid

one fee for general hospital practice, and could attend at each or both as he chose. Two clinical lectures per week were given by members of the staff during term at one or other place, and attendance on these was compulsory for all students. In spite of many early difficulties this joint arrangement continued.

About this time the Jessop Hospital for Women became recognised as a maternity centre, and the students began to attend their cases there. It was

FIG. 5.



Sheffield Hospital for Women, Figtree-lane, 1864.

managed independently by the hospital, and the clinical committee had no control over it. Indeed it was not until 1908, three years after the foundation of the university, that the Jessop Hospital joined the two general hospitals, and the original clinical committee became a committee of the council of the university. On this, in addition to representatives of the staffs, the dean of the medical faculty and various university representatives, both medical and lay, are appointed. More recently the Children's Hospital has joined the scheme.

This committee is responsible for the organisation of all clinical teaching both general and special. The student pays one inclusive fee to the university which covers all forms of hospital practice required. A definite scheme of study is laid down. Clinical appointments must be taken in certain rotation and equally distributed between the institutions concerned. On the other hand, the student is allowed a free choice as to the actual member of the staff under whom he wishes to hold each appointment. For some years the Faculty of Medicine has tried to bring the earlier laboratory subjects, anatomy and physiology and the later clinical studies more closely together. This although most desirable in theory is not easy in practice. Even after an extended trial the method adopted has not met with the universal approval of the staff, and there are those who consider that the objections outweigh the advantages.

The general plan adopted in 1919 was as follows :—

(*a*) To shorten the pre-clinical studies of anatomy and physiology by holding a second M.B. examination at the end of the second year.

(*b*) To start the clinical studies earlier—viz., at the beginning of the third year.

(*c*) To make further laboratory studies of anatomy and physiology run alongside the earlier clinical studies during the whole of the mid-period of the curriculum—i.e., from the beginning of the third to the end of the fourth winter, when at the third M.B. examination, anatomy, physiology, pharmacology, and pathology are all taken together.

N.B.—For this para-clinical instruction in anatomy and physiology three hours a week are assigned for each subject during the third and fourth winters, two-thirds of which is devoted to practical work in the laboratory.

In 1929 the curriculum was lengthened from five to five and a half years, and some rearrangement in the students' work in these subjects was made, but the general principle outlined above was retained.

The teachers of the pre-clinical subjects favour it. They say that it stimulates interest in the laboratory studies by giving the student an insight into the application of these to clinical work. Amongst the clinical teachers opinions differ.

Special Studies.

During the last few years the opportunity for acquiring a fuller knowledge of mental diseases, the importance of which is being realised everywhere, has been much increased in Sheffield by the coöperation of the South Yorkshire Mental Hospital and the two general clinical hospitals. At each of the latter there is now an out-patient clinic for mental diseases in direct association with the South Yorkshire Mental Hospital, medical officers from which assist in its work.

Although it is not immediately concerned with the teaching of students, reference must be made to the experimental field laboratory at Redmires, connected with the department of pharmacology of the university. The quality and quantity of experimental work carried out there during the last ten years by Prof. E. Mellanby, to say nothing of the well-known researches of Mrs. May Mellanby, have not only placed them both in the forefront as original investigators, but have also exerted a wide influence for good over every department of the Faculty of Medicine, and brought renown to the university as a centre of medical research.

Connected with the Faculty of Medicine there is also a flourishing dental school. Begun in 1895 in connexion with the Royal Hospital, it was actually a complete teaching department in 1900. It has fully equipped laboratories for dental mechanics in

FIG. 6.

Jessop Hospital for Women, 1930.

Photograph by Pawson and Brailsford.

the university buildings, and at the Royal Hospital there is a large dental clinic which was entirely refitted and equipped two years ago.

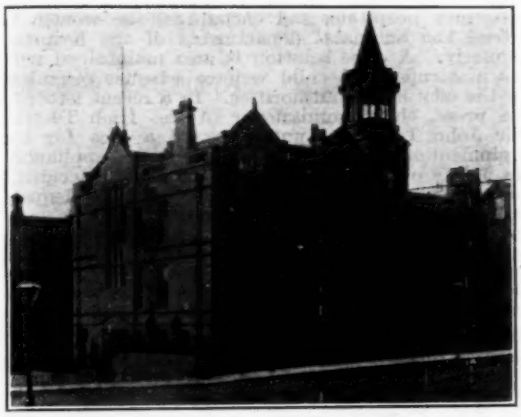
Up to the time of the late war, although the staffs of the four hospitals had been thus acting together for purposes of clinical instruction, yet the institutions themselves remained as distinct and isolated from each other as on the days they were founded. Indeed, not infrequently the joint clinical committee has had to step warily in order to avoid giving offence. During the war, however, members of the various hospital

staffs worked daily side by side with each other, and when the war was over they felt that this joint working was something worth trying to preserve.

Joint Hospital Staff Club.

With this object the members of the staffs of the four voluntary hospitals formed themselves into a joint hospital staff club, of which everyone on election to one of the honorary staffs becomes, ex-officio, a

FIG. 7.



The Children's Hospital, Sheffield.

member. The club has a business side and a social side. Thus, on the one hand it forms a body before which all matters affecting the honorary staffs as a whole, or any one of them individually, can be brought up and discussed. Since its formation it has helped to solve many problems which have from time to time arisen, and, without it, might easily have caused considerable difficulty. Its social side has also proved of great value in bringing the members of all the staffs into frequent contact with each other, promoting friendships, and removing misunderstandings.

This apparently unimportant arrangement has had far-reaching and unexpected effects. In the first place it suggested the idea that the four voluntary hospitals themselves might with advantage come closer together, indeed that they might really become one institution. As a result of a joint memorandum sent out to their various boards by the staff club, this idea was brought to a head, and the four boards and staffs did actually meet to consider the suggestion at the invitation of the then Lord Mayor.

Joint Hospital Council.

Once the ice was broken, the boards of the four hospitals began to come regularly together. The most important immediate effect was connected with the financial side, and resulted in the formation of the "penny-in-the-pound" scheme, the development of which has greatly altered local hospital conditions. Apart from the merits or demerits of the scheme as a whole, it has aroused a widespread local interest in the voluntary hospitals, and incidentally has since its formation produced a million sterling in aid of the hospitals. This scheme is controlled and organised by a body known as the joint hospital council, which in addition to having representatives of the boards and staffs of the four voluntary hospitals, has also representatives of the Edgar Allen Institute, of the contributors' association, and also various ex-officio members. Its chairman since its formation has been the Vice-Chancellor of the University (Sir Henry Hadow). Each hospital board still controls the domestic affairs of its own hospital, whilst the joint hospital deals only in a consultative and advisory capacity with the many questions which are common to all.

Soon after this coöperative movement began, the idea was entertained of building one large joint hospital, situated on the outskirts of the city, and transferring the four existing hospitals there. The scheme got so far that a suitable site was bought for the purpose. Meanwhile a period of serious and unexpected depression in the coal and steel trades, the two staple industries of the district, made any early realisation of this costly scheme impossible. It was hoped that in a few years a revival of trade would ensue. These hopes have not as yet been realised, and it has become obvious that under even the best circumstances it will be a very long time before such a costly undertaking will be possible.

As has been mentioned above, the hall situated in the grounds of the purchased site has been rented to the Jessop Hospital for Women, and converted into an annexe for septic maternity cases. This has proved very valuable for its purpose.

Future Possibilities.

With the coming into force of the Local Government Act of 1930, the possibility of providing the required accommodation on different lines has presented itself. The larger of the two poor-law hospitals in Sheffield is conveniently situated on the outskirts of the city in a large area of ground. It has a large number of beds, some excellent wards, and space enough on which to add anything further that may be required.

It seemed therefore possible to those concerned that, if the city council were willing, joint action might be taken by the voluntary hospitals and the council, and the requisite relief to the waiting lists of the voluntary hospitals obtained by providing sufficient extensions at this municipal hospital. With this object, an advisory committee, composed of equal representatives of the municipality and the voluntary hospitals, has been appointed, and has agreed upon certain general principles under which such joint action could be carried out.

At the present time these negotiations are not yet complete, but it may be said that, so far, there has been an obvious desire on both sides to work together and that such difficulties as have arisen have been met in a spirit which promises well for the future. Should the scheme materialise there is every possibility that all the institutions for the treatment of the sick in the city will be working in close coöperation not only with each other, but also with the university.

A highly satisfactory note can be added as to the relations of the faculty of medicine and the staffs of the voluntary hospitals to the medical officers of the various city hospitals, and also to the medical practitioners of the city and district. Of the former, all those holding official posts dealing with subjects required by the curriculum have in the past successively joined the staff of the faculty and rendered invaluable services. The chair of hygiene has been filled by successive medical officers of health; the lectureship on forensic medicine is held by the city police surgeon; infectious diseases and tuberculosis are dealt with by the respective municipal medical officers at the head of each of these departments.

As regards the relations between the medical men practising in the city and district and the faculty of medicine, it is perhaps enough to say that in 1920 the panel committee of Sheffield voted a sum of £1000 to the university towards the equipment of the new field laboratory for its department of pharmacology.

FIRE AT A FEVER HOSPITAL.—On Monday last week a fire broke out at Lodge Moor Fever Hospital, Sheffield. The medical staff and the male nurses got the flames under control by the time the fire brigade arrived, and the damage was confined to the roofs of the wooden buildings.

MEDICINE AND THE LAW.

Alleged Neglect to Give Proper Medical Attendance.

AT Bodmin assizes on June 14th a man named Snow was charged with the manslaughter of his wife by neglect to give her proper medical attendance. She had been ill, it appeared, for a long time. Counsel for the prosecution suggested that her need of medical attention must have been apparent to the husband. A doctor who had attended the woman gave evidence that after some time she objected to his advice, and he then put the district nurse in attendance. The nurse stated that, after she had attended the patient a little while, the husband told her that there was no need for her to come again, as everything was being done that was necessary. It was alleged that eventually, when his wife was getting worse, the husband asked the doctor to examine her. The doctor ordered her immediate removal to the infirmary and there the doctors and nurses were horrified at her condition. She died soon afterwards. Mr. Justice Swift told the jury that he was unable to understand why the doctor and the district nurse ceased to attend the woman who was consequently left in the sole charge of the husband and a feeble-minded daughter. It was for the jury to say whether such neglect as there was could be brought home to the accused. The jury then found Snow "not guilty," and he was discharged.

Earlier in the day the learned judge had expressed surprise that Snow had been singled out for prosecution. If any charge were to be proceeded with, he said, others should be in the dock with the accused. Later he asked why the daughter, the doctor, or the district nurse was not included in the charge. This was no doubt a rhetorical question. Every judge has been an advocate in his time, and he properly employs the art of the advocate to secure acquittal where he thinks that justice requires a verdict of "not guilty." There is no need to take too seriously the suggestion that the doctor and the district nurse should have been prosecuted for the poor woman's manslaughter. They did not cause the neglect to which death was due. The doctor whose advice is rejected and the district nurse whose services are refused cannot be held criminally responsible for that rejection or refusal. The doctor has no power to enforce a course of treatment. If he attempted to do so, nobody would be more ready than His Majesty's judges to point out his error.

IRELAND.

(FROM OUR OWN CORRESPONDENT.)

Ambulance Work in Ireland.

THE Dublin Ambulance and Nursing Divisions of the St. John Ambulance Brigade in Ireland had their annual inspection last Saturday in Merrion-square in glorious weather. The Brigade in Ireland has shown no sign of inertia following on the war period, but having performed notable service both during the war, and subsequently during the troubled times in Ireland, has now thrown its energy into social services useful in peace time. It trains men and women in first-aid, and women in home nursing. It supplies skilled first-aid workers to attend theatres, picture houses, and other places of amusement, as well as horse and motor races and public functions in general. A year ago when some quarter of a million people assembled in the Phœnix Park for the celebration of the anniversary of Catholic emancipation, the entire ambulance arrangements were carried through without a hitch by the St. John Ambulance Brigade. In addition to this ambulance work proper the Brigade (in cöoperation with the British Red Cross Society) maintains the Hospital Supply Depôt founded during the war, its gifts being now devoted to the patients of the Queen's Institute of District Nurses. During the year some 70 bales of dressings were supplied gratuitously to the district nurses throughout Ireland. Invalid requisites are also supplied to poor patients, or on very easy terms to those who cannot pay much. The welfare department gives free dinners daily to some 70 destitute expectant or nursing mothers, and when a child is born baby-clothes are given. Many of the women attending this department would be on the verge of starvation were it not for the food there given them. The department works in close association with the maternity hospitals, and encourages the women to attend the antenatal departments of the hospitals regularly. A close relation is also maintained with the maternity and child welfare schemes organised by the city health authorities. In a recent letter to the press, the Commissioner of the Irish District (Sir John Lumsden) puts forward a plea for the equipment of motor transport with first-aid appliances. He points out the increasing frequency of accidents due to motor transport, and the necessity for adequate first-aid treatment.

"The results of many crashes are grave enough, but even graver are the aggravated injuries caused by injudicious handling of victims by well-meaning but untrained by-standers. Every facility exists for the acquisition of a knowledge of first-aid, and everyone should possess it."

Sir John suggests: that all 'buses and trams should carry a first-aid box, with dressings, restoratives, iodine, &c.; (2) that all drivers and conductors should be trained to render first-aid; and (3) that all A.A. and R.I.A.C. patrols should be likewise trained, and carry first-aid material.

SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The New M.O.H. for Edinburgh.

THE town council of Edinburgh have appointed Dr. John Guy as medical officer of health for the city, in succession to Dr. William Robertson. A graduate of Glasgow University, he has been tuberculosis officer and assistant medical officer of health for Edinburgh for 16½ years. His clinical experience has been various, being gained especially as medical superintendent of the sanatorium, the orphanage, and epileptics' colony at Quarrier's Home, Bridge of Weir. His main experience has been in dealing with tuberculosis; but he also had an active part in the public health administration during and after Dr. Maxwell Williamson's time.

Edinburgh is now face to face with a group of the most difficult problems in administrative medicine, including not merely the readjustment of school health administration, and the work of the transfigured poor-law, but particularly the correlation and development of hospital services. Dr. Guy is credited with very definite views on hospital policy, but public opinion is ripe for drastic changes, and the use he makes of his opportunity will be watched with keen interest.

Measles in Edinburgh.

This summer measles has become formidable in Edinburgh. As early as January, and even in December, small numbers of cases were notified; but they began to rise rapidly towards the end of March, when 104 cases were intimated. At the same period the notifications in Glasgow, Dundee, and Greenock had risen into hundreds per week. For the five weeks in April the Edinburgh numbers were 158, 191, 282, 419, and Dr. Guy reports that the epidemic, which started in the Canongate and spread through every district in the city, is the worst that Edinburgh has known for many years. During the first two weeks of June 1401 cases were notified, and since March of this year the disease has visited over

4000 homes representing some 8000 cases. Twenty-one deaths have been attributed to measles in the last fortnight.

It is suggested that the normal two-yearly visitation was missed last year and that the susceptible material is accordingly much greater. Glasgow had its usual winter and spring epidemic, but this has now tailed off. There is nothing to indicate that this epidemic shows the peculiar virulence of the great epidemic of 1893–94 and the lesser epidemics of the years following. It was then commonly said by the doctors that, when called in, they had usually to sign the death certificate. Two, three, and four deaths in a family were relatively common.

LISTER INSTITUTE OF PREVENTIVE MEDICINE.

REPORT OF GOVERNING BODY FOR 1930. CHANGES IN THE STAFF.

THE names of Sir Charles Martin, F.R.S., and of Prof. A. Harden, F.R.S., are so closely and so honourably associated with the Lister Institute of Preventive Medicine that the news of their approaching retirement, on reaching the age limit, will be received with regret throughout the scientific world. In the annual report of the Institute which has just reached us the governing body pay tribute not only to the scientific distinction but also to the high administrative ability of Sir Charles Martin, who has been director of the Institute for 27 years. Prof. Harden, whose researches into the chemistry of alcoholic fermentation were recognised last year by the award of the Nobel prize in chemistry, has served for even longer (33 years), and as head of the department of biochemistry he has played an important part in the scientific development of the Institute. The governing body are fortunate in being able to fill the vacant appointments by men who have not only the requisite scientific standing, but who have had long experience in association with their predecessors. Prof. J. C. G. Ledingham, F.R.S., who becomes director, joined the serum department of the Institute in 1905, and when his chief, the late Dr. George Dean, was transferred to the bacteriological department, Dr. Ledingham followed, and in 1908 succeeded him as head of the department. Mr. R. Robison, D.Sc., F.R.S., who will have charge of the department of biochemistry from January of next year, has been on the staff of the department since 1912, and its first assistant for over ten years. He was made a Fellow of the Royal Society this year for his researches on ossification, which revealed the enzyme (phosphatase) as an active agent in this complicated process.

Other changes of staff include the resignation of Dr. T. W. Lumsden, Mr. E. Boyland, and Miss M. H. Roscoe, on receiving other posts, and the attachment of Mr. R. R. McLaughlin, M.Sc., Ph.D., and Miss A. M. Copping, M.Sc., to the departments respectively of biochemistry and experimental pathology.

The governing body record appreciation of the continued coöperation which the Institute has enjoyed with other scientific bodies whose financial support, by the provision of the salaries of skilled investigators working in different departments, has greatly increased its scientific activities.

DEPARTMENT OF BACTERIOLOGY.

The researches carried on in this department include the experimental production by Dr. G. F. Petrie of potent serum derived from the successful immunisation of a horse with vaccinia virus. Potency tests with the concentrated serum are being carried out by Prof. Ledingham, and its content of antiviral substance proves to be large. In view of statements to the effect that some cases of post-vaccinal encephalitis have benefited by the administration of serum from convalescent vaccinees it is proposed to offer the serum for trial in such cases. Its value in the treatment of small-pox also requires investigation.

Dr. G. H. Eagles is studying the properties of a strain of cow-pox recovered from a vesicular lesion on the arm of a milker. On rabbits and monkeys it produces, after scarification, lesions which differ somewhat from those following scarification with calf-propagated lymph, in the intensity of the associated dermal inflammation and hæmorrhagic tendency. Monkeys vaccinated with this strain fail to respond to small-pox virus recovered from cases of the mild form now prevailing in England. It may be recalled that in 1925 Prof. Ledingham reported the fact that small-pox virus when inoculated intradermally in rabbits produced a characteristic lesion which is neutralised by antivaccinial serum. McKinnon and Defries of Toronto, and Sobernheim of Berne, have recorded similar findings, but so far it has been impossible to secure propagation of the virus from rabbit to rabbit beyond one or two passages. Dr. Eagles is again attacking this problem of adaptation. If a method of propagation succeeds, it may be the means of securing new strains of vaccinia at will from small-pox cases and investigating their properties.

Poliomyelitis and Encephalitis.

Research on poliomyelitis, subsidised by the International Committee for the Study of Infantile Paralysis, includes the study of the path of spread of the poliomyelitis virus in the experimental animal by Dr. R. W. Fairbrother and Dr. E. W. Hurst, who have also investigated a number of cases of post-vaccinal encephalitis, and two cases of a similar condition occurring as a complication of small-pox. It was not found possible to excite nervous lesions in the monkey or the rabbit by intradermal inoculation of ordinary vaccine lymph or neurovaccine of rabbit or monkey origin; on the other hand, intracerebral inoculation of monkey or rabbit neurovaccine was effective in both species of animals. In the monkey the reaction is primarily and mainly meningeal, with secondary changes in the cortex underlying the areas of most severe meningitis. These lesions differed entirely from those of post-vaccinal encephalitis and the characteristic perivascular demyelination of that disease was never reproduced. Virus was present in large amount in the nervous tissues and also in the spleen, which was the seat of marked alterations. Smaller amounts were present in various other organs

The cases of paralytic accident arising in the course of antirabic treatment have sometimes shown a histological picture closely resembling that in post-vaccinal encephalitis. Many observers have ascribed these accidents to the toxic action of the foreign brain material introduced during treatment, and have claimed, usually without adequate histological control, to have reproduced the condition in experimental animals, particularly rabbits. Dr. Hurst has made inoculation experiments designed to test the importance of these observations, if confirmed, in throwing light on the causation of disseminated encephalomyelitis. He concluded that while paralysis might occur in the rabbit injected with foreign nervous substance, such paralysis could not be brought into relationship with the paralytic accidents in man and that the histological picture seen in man could not be reproduced in rabbits by such means.

With Dr. Fairbrother, Dr. Hurst has started experiments to determine whether coincident infection with vaccinia has any power to modify the reaction of the central nervous system to poliomyelitis.

Immunising Properties of Bacteria.

Studies on antigenic constitution and immunising properties of bacteria have been continued by Dr. J. A. Arkwright, F.R.S., and under his direction by Miss R. M. Pitt and Dr. N. C. Graham. Dr. H. L. Schütze, continuing immunity studies in mice, has shown that only the O or somatic content of the bacterial vaccine is capable of conferring protection

against *S. aertrycke* and *S. enteritidis* infections. The presence or absence of H or flagellar antigen in the vaccine is without effect on the prophylactic value. An efficient vaccine may be prepared from an alien species so long as the somatic antigen in each is identical. For example, a *paratyphoid* B vaccine will protect against an *aertrycke* infection and *typhoid* vaccine will protect against a *Gaertner* infection.

Dr. Muriel Robertson and Dr. A. Felix have tried to produce passive protection against anaerobic infections by antibacterial (anti-O) sera. The anti-O serum was found to be strictly specific, affording protection only against infection with *V. septique* of the same serological group. Work is now in progress with *B. tetani* and *B. welchii*, but up to the present the titre of the O immune serum to *B. tetani* has not been sufficiently high to protect mice against infection with spore-calcium suspensions.

It has recently been asserted that tubercle-infected rats on a diet deficient in vitamin A are particularly sensitive to tuberculin, on the ground that the lethal dose of tuberculin for such rats is considerably smaller than that for rats on a similar diet but not so infected. Dr. Schütze and Dr. S. S. Zilva have been able to show that this phenomenon is a purely non-specific one; rats infected with *B. tuberculosis* are hypersensitive to the toxic action of tuberculin, but they are equally hypersensitive to other bacterial toxins.

BCG.

Calmette and his school consider that there is complete safety in using the avirulent strain of the tubercle bacillus known as BCG as a living inoculum for prophylaxis against tuberculosis, since the strain has completely lost its virulence for man and laboratory animals. Dr. Moti Malkani, of Karachi, India, working in this department with a strain obtained from the Pasteur Institute, has come to the conclusion that the virulence of the strain is not completely gone, and that when introduced into the less resistant animals it may be capable of causing widespread and even fatal infection. Some 28 guinea-pigs and 18 rabbits were inoculated by various routes. Of these animals 18 showed extension of infection beyond the site of inoculation to glands and other organs. In one of them the lesions were particularly pronounced and of a caseous nature. Two guinea-pigs died, to all appearances, as the result of infection with BCG. The report adds: "This strain, therefore, though much attenuated, cannot be regarded as avirulent for laboratory animals. It will depend on the degree of resistance it meets with in the animal whether it disappears from the system or leads to a process that may terminate fatally."

(To be concluded.)

LONDON HOSPITAL MEDICAL COLLEGE.—Prizes will be distributed at this college on Tuesday, June 24th, at 3 P.M., by Lord Rayleigh.

QUEEN CHARLOTTE'S MATERNITY HOSPITAL.—The isolation block, the first portion of the new hospital at Hammersmith, will be opened by Princess Mary on July 10th. The annual report states that on many occasions during the past year the hospital was overcrowded, and patients presenting themselves with orders of admission had hastily to be accommodated elsewhere, while others wishing to come in had to be refused. Of the 2360 patients, 2151 were "booked" and 209 "emergency" cases. Of the booked patients seven died, being at the rate of 3·2 per 1000, but there were nine deaths among the emergency patients, a rate of 43 per 1000. Moreover, in booked cases the infantile death-rate was only 25 per 1000, while in emergency cases it was 153 per 1000. The pressure upon accommodation has become so acute that the committee has converted an empty house on the Hammersmith site into an auxiliary hospital with about 20 beds, which will probably be ready next month. It is hoped that it will now be possible for every patient to receive an anæsthetic during her confinement. When the new buildings are completed Queen Charlotte's will be the largest maternity hospital in the Empire with at least 358 beds, of which between 80 and 100 will be in private paying wards for middle-class patients of small means.

Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are 1929 statistics of an English and a Scottish county, of a metropolitan borough, and of two modern colliery districts.

Name of district and estimated (R.-G.) mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant and neonatal mortality.	Youngchild (1–5 yr.) mortality.	Maternal mortality from childbirth.
Wiltshire .. (300,306)	14·9	12·5	0·59	1·65	1·9*	2·6	55/—	—	6·0
Roxburghshire (19,492, landward area)	15·9	13·7	0·36	1·63	1·7	2·7	71/39	23	0·0
Stoke Newington.. (50,040)	16·1	13·4	0·94	2·04	2·6	2·6	47/26	17	4·9
Doncaster R.D. .. (44,680)	26·7	10·9	0·90	0·56	2·6	1·5	88/—	—	7·5
Adwick-le-Street U.D. (19,230)	23·3	11·1	0·94	0·64	3·5	1·0	131/—	—	2·2

* This figure would probably be about 2·9 if "other respiratory diseases" were included.

Registered stillbirths per 100 live births: Wiltshire 4, Stoke Newington 3·8, Doncaster 4·6, and Adwick-le-Street 7·1.

Wiltshire.

Dr. Claude E. Tangye says that, apart from a large amount of preparatory work in anticipation of the Local Government Act, the year has been an eventful one. A permanent women's ward has been built at Harnwood tuberculosis hospital. The old Trowbridge cottage hospital has been purchased for clinic purposes. The county small-pox hospital at Ogbourne was progressively enlarged to cope with the small-pox outbreak, which only ceased at the end of the year. The county pathological work has, with great advantage, been concentrated at the Salisbury infirmary. In continuation of the policy of appointing whole-time local medical officers for county purposes, Dr. Jean Murray, M.O.H. for Trowbridge and Bradford urban and rural districts, has been appointed an assistant county M.O.H. The scheme for better supervision of pre-school-children has progressed, and arrangements are being made to secure more continued treatment at the venereal disease centres. The public medical services are being coördinated in such a way that the new responsibilities under the Local Government Act will be met by simple and natural development of the county health department. Progress has been made in pooling infectious hospital accommodation by the closure of the Cricklade and Wootton Bassett hospital and an arrangement for the cases from this area to be admitted to the Swindon hospital. Swindon is badly off for a general hospital, and the county council proposes to utilise a poor-law institution at Salisbury for non-notifiable diseases and to establish a subsidiary unit at Swindon.

The rainfall was more than three inches less than in the previous year and there was a shortage of water in many districts during the dry summer. The summary of analysts' reports shows that of 30 effluents from sewage disposal systems in six rural districts the effluent was definitely bad; of these three were in Chippenham, two in Pewsey, and one in Tisbury. Five were described as poor; one being in Swindon, two in rural districts—Bradford-on-Avon and Devizes

—two in War Office schemes at Enford and Netheravon. The remaining effluents were mostly described as good or fair. During 1929 901 new houses were built, of which 346 were erected by local authorities and 302 with State assistance by other enterprise. At the 1921 census there were 66,874 houses, and since then 8800 new houses have been erected, of which 3390 were built by local authorities, 3622 by other enterprise with State aid, and the remainder without State aid. The borough of Malmesbury is the only authority which has not erected houses. Since the passing of the Housing (Rural Workers) Act, 1926, 150 applications have been dealt with. At the end of 1929 financial assistance amounting to £5438 had been promised for 67 premises; £2621 had been paid for 29 premises completed; and work on 5 other houses had been completed and was in hand in 20 other instances.

The notifications of tuberculous milk, produced in Wiltshire, from outside authorities numbered 43, mostly from the L.C.C. As the result of the follow-up 25 cows were slaughtered under the Tuberculosis Order, and the udder was found to be affected in 23. Another cow was sold for slaughter before the biological examination was completed. The county veterinary surgeon had frequently to resort to group sampling and repeated visits before finding the offending cow and in several cases the investigations were not completed at the end of the year. Of the 223 samples taken by the Sale of Food and Drugs Act inspectors for the purpose of the Milk and Dairies Order, 23 were found to be tuberculous and in the follow-up 17 tuberculous cows were slaughtered and the udder was found to be infected in all but two. Among the 155 small-pox cases notified there were several severe cases but none ended fatally. No case of small-pox was notified during the first three months of 1930 and it is hoped that the epidemic is now over. In September a conference was held between Dr. Tangye and the medical officers of the isolation hospitals on the problem of "return" cases of scarlet fever. The conclusions reached were:—

That separate wards should be provided for uncomplicated cases and for cases complicated by nasal and other discharges; that there should be single-bed observation wards in every hospital; that the cases should be selected for admission by the medical officer of health alone so as to avoid overcrowding of wards and the refusal of urgent cases later on in an epidemic; and that the services of ear and throat surgeons should be made available.

Certified midwives attended two-thirds of the births in the county and sent for medical help in 34 per cent. of their cases. The county council pay two-thirds of the expenses of a two months' post-certificate course for midwives. The standard of antenatal work by midwives has decidedly improved and all the trained midwives keep satisfactorily the records required by the Central Midwives Board.

Roxburghshire.

Dr. M. J. Oliver, in submitting his thirty-fifth annual report for the county (four were omitted during the war period), considers an active health authority should be the best judge of how to tackle problems within its own district, and he complains that the efforts of the staff are frequently turned in a new direction before their work is satisfactorily completed. In his county he would, at the present, put first the making effective of the excellent dairy by-laws. He would put housing second and in the landward districts the extension of work under the Housing (Rural Workers) Act. Thirdly, drainage work requires greater supervision in both burghs and landward districts. The county nursing association does good infant visiting work restricted, however, to its members, and this work should be extended. Finally, there is a great waste of sanitary work, such as inspection of houses, water-supplies, and dairy farms, without any improvement following. The local authorities possess the power and the sanitary administration should be tightened up.

In the last annual report it was mentioned that the Kelso district committee had taken over the Ednam water-supply scheme from the proprietor. The works for distribution appeared to be in excellent order. Subsequently complaints were received as to the quality of the water. Analysis of a sample showed a high degree of pollution. There being no other source of supply, the water was at once chlorinated and steps were taken to have the ground opened up, when much pollution from drains was found, including the effluent from a septic tank. The excavations will be continued in the hope of rendering the source safe for public use. There has been so much activity under the Housing (Rural Workers) Act that the staff have been unable to devote attention to the inspection required by the Housing Regulations, 1928. 177 applications were approved under this Act and the work was completed at 111 houses during the year. The control of infectious diseases in the south-east counties of Scotland is discussed in an interesting manner and Dr. Oliver particularly emphasises the fact that removal to an isolation hospital is a preventive of very small value indeed in scarlet fever unless it is backed up by subsidiary measures.

Dr. G. F. B. Page, clinical tuberculosis officer, describes how the county tuberculosis scheme has been gradually built up since 1920. He particularly insists that the first essential of a tuberculosis scheme is to have it carried out by a man with real experience of tuberculosis and not by an "omnibus" medical officer who has all sorts of other duties to perform. Experienced practitioners cannot be expected to consult young tuberculosis officers with no more time and knowledge at their disposal than the "omnibus" medical officer can claim. A table giving the tuberculosis death-rates in Scottish counties during the last six years shows that the Fife and Roxburgh rates have steadily declined whilst the rates in the other counties have mostly remained stationary. Under the Tuberculosis Order nine cows were slaughtered under police direction. All were suffering from tuberculous emaciation and eight were cows in milk.

Dr. Oliver comments on the very shortsighted policy of farmers only summoning veterinary assistance when all the harm possible by infection has been done. He also remarks on the great difference in the feeding of the milk cows in the various districts as reported by the four veterinary inspectors. With such wide differences in feeding it is very unlikely that all are equally economical, and he inclines to think that here is an opening for the veterinary profession to exert a beneficial influence.

Stoke Newington.

Dr. F. D. Ross-Keyt says there has been no extension of the public health services in this metropolitan borough, but those in operation continued to progress favourably. In October, 1928, the council approved a scheme for the appointment of a panel of four obstetrical consultants, who may be called in by medical practitioners in difficult midwifery cases. The following are the conditions: that the patient be a Stoke Newington resident; that the medical practitioner immediately inform the medical officer of health as to the particulars of the call; and that the consultant's fee of £5 5*s*. be inclusive. The scheme is intended for the use of persons who cannot afford the consultant's ordinary fee, and the council reserve to themselves the right to recover the fee if the patient's circumstances permit. Only one consultation took place under the scheme during 1929. This was a case of puerperal pyrexia which was removed to a fever hospital and recovered. There were fewer L.C.C. houses available during 1929 and only 17 families were removed from Stoke Newington as compared with 36 in the previous year. Of these two families went to the Lewisham estate, eight to the Hendon estate, and seven to the Becontree estate. Many desirable tenants are unwilling to travel the distances to and from work necessitated by the removal. Others living in an overcrowded state cannot

be recommended owing to poverty or low standards of cleanliness. Twenty-two tenants who had recently had their rentals increased applied for certificates that their houses were not in all respects fit for habitation, under the Increase of Rent, &c., Acts, 1920 to 1923, and in every instance the certificate was granted. Owing to the lack of alternative accommodation cases of overcrowding have to be dealt with leniently.

Immunisation against diphtheria has been carried out on a small scale, and 102 children completed the preliminary cause of three immunising injections in 1929. The number of children protected shows an increase of the previous year's work. Of the 16 notified cases of ophthalmia neonatorum, one who received hospital treatment for some months resulted in permanent loss of vision but it is not mentioned at what stage the case came under hospital treatment. The severe epidemic of influenza during the first quarter chiefly affected the older members of the community.

Doncaster.

Dr. A. B. Dunne says his rural district has never wholly recovered from the coal stoppage in 1926. There are five collieries of the largest class. Work has been irregular and there has been unemployment and distress. Agriculture still employs a large number of men in the district and Messrs. Pilkington have a large glass works. Much of the charm of the district has been spoilt by ribbon building. Industrial atmospheric pollution is on the increase, and the smoke from the collieries adversely affects the trees. The district council has not become a member of the regional smoke committee. About 2500 milch cows are stalled in the district, and amongst these were found 11 cases of tubercle of the udder. Of the 11, two were reported by private veterinary surgeons, one by the owner, and eight were found by the county veterinary surgeons. In addition to the foregoing, 19 cows and two bullocks with tuberculous emaciation, and 22 cows and one bullock with open pulmonary tuberculosis were slaughtered.

Adwick-le-Street.

Dr. A. B. Dunne shows that when the standardising factor is applied the death-rate of 11·1 becomes 13·8. (The use of the same factor in the rural district of Doncaster, it may be noted, made little change.) The water-supply of this urban district is derived from a well sunk in the limestone and softened by the council from 38 degrees to 10 degrees of hardness. The council have had some difficulty with the sand filters of the softening plant resulting in the deposit of much lime in the service pipes. Flooding in the Bentley moor neighbourhood has been lessened by the raising of the bank of the Ea Beck, but Dr. Dunne points out that the flow of water down the beck is still liable to obstruction by a road bridge. The housing conditions are good; in fact, building has ceased and there are approximately 50 empty houses.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED JUNE 7TH, 1930.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 237 (last week 327); scarlet fever, 1743; diphtheria, 1085; enteric fever, 64; pneumonia, 898; puerperal fever, 39; puerperal pyrexia, 116; cerebro-spinal fever, 14; acute poliomyelitis, 1; encephalitis lethargica, 15; continued fever, 2; dysentery, 2; ophthalmia neonatorum, 92. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on June 10th–11th was as follows: Small-pox, 434 under treatment, 25 under observation (last week, 449 and 15 respectively); scarlet fever, 2002; diphtheria, 2174; enteric fever, 25; measles, 687; whooping-cough, 73; puerperal fever, 22 (plus 14 babies); encephalitis lethargica, 122; poliomyelitis, 1; "other diseases," 20 At St. Margaret's Hospital there were 17 babies (plus 9 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox or enteric fever, 54 (12) from measles, 10 (4) from scarlet fever, 20 (4) from whooping-cough, 34 (7) from diphtheria, 48 (15) from diarrhœa and enteritis under two years, and 22 (5) from influenza. The figures in parentheses are those for London itself.

Eight fatal cases of measles were reported from Southampton, 6 each from Birmingham and Liverpool. Liverpool also reported 6 deaths from diphtheria.

The number of stillbirths notified during the week was 304 (corresponding to a rate of 41 per 1000 births), including 65 in London.

Correspondence.

"Audi alteram partem."

BRITISH MOSQUITOES.

To the Editor of THE LANCET.

SIR,—In your report last week (p. 1312) of a visit paid by members of the Royal Institute of Public Health to our mosquito control laboratory, the writer states that "in most inland places six species of mosquito are found." This statement requires modification; the actual fact being that in most inland places *not more than six* species of mosquitoes are likely to be met with to any appreciable extent. The so-called household mosquitoes, *Culex pipiens* and *Theobaldia annulata*, are common in all parts of the country, the latter being a fierce and poisonous biter. To these we must add eight other common species which breed in inland waters (*Anopheles maculipennis* and *bifurcatus*, *Aedes annulipes*, *maculatus*, *rusticus*, *punctor* and *cinereus*, *Culicella morsitans*), as well as two species which breed chiefly (*Aedes caspius*) or exclusively (*Aedes detritus*) in coastal districts. Since each of the above-mentioned species selects some particular kind of environment in which to breed, it is very unusual for more than three or four species (over and above the two household ones) to be at all prevalent in one and the same locality.

I am, Sir, yours faithfully,

JOHN F. MARSHALL,
Director, British Mosquito Control Institute, Hayling Island.

June 16th, 1930.

"DISCARDED METHODS" IN LARYNGOLOGY.

To the Editor of THE LANCET.

SIR,—In Mr. Lawson Whale's book on modern treatment of diseases of the throat, nose, and ear, reviewed in your issue of June 7th (p. 1238) I find under the heading of Discarded Methods the "complete or partial removal of the uvula" and the "indirect (original laryngoscopic) method" for laryngeal work. It will be a sorry day for certain patients when the shortening of the uvula is discarded. We know that an inordinately long uvula may be present without any symptoms and we know that a cough may coexist with a long uvula and be due to some other cause altogether; but we also know—or, at least, I know—that in many cases a cough is caused by an elongated uvula and is removed at once and, often, for all, by the shortening of that appendage.

As regards the discarding of the original laryngoscopic or indirect method in favour of the direct endoscopic method for laryngeal work, the latter may be much easier for the operator, but it is certainly not easier for the patient, unless under a general

anæsthetic. For the most common innocent new-growth in the larynx—namely, the so-called fibroma on the edge of a vocal cord, at or near the junction of the anterior and middle thirds, the specialist ought to be able to effect the removal by means of the ordinary forehead and laryngeal mirrors and laryngeal forceps, without the paraphernalia of the endoscopic apparatus, and without general anæsthesia. This applies still more to the electro-cauterisation of tuberculous ulcers in the larynx, as it may have to be repeated on several occasions.

I am, Sir, yours faithfully,

London, June 18th, 1930. JAMES DUNDAS-GRANT.

THE CAUSATION OF ECLAMPSIA.

To the Editor of THE LANCET.

SIR,—In his letter last week Dr. Theobald makes it clear that his theory of the causation of eclampsia is that the detoxicating action of the liver fails and that this failure is "because the fœtus requires 8 g. of calcium, and relatively large supplies of sugar, iron and iodine during the last four weeks of pregnancy." It is true that some interference with the intestines from the bulk and weight of the pregnant uterus is also admitted, but these possibilities, as also the psychological trauma, are thrown in as a kind of makeweight. The essence of Dr. Theobald's theory is that the demands of the fœtus for calcium, sugar, iron, and iodine cause the detoxicating action of the liver to fail.

How can this theory account for the greater incidence of eclampsia in primiparæ, and in primiparæ, also, who appear particularly fit right up to the onset of eclampsia? I suggest that the anxieties and psychological trauma are likely to be greater in a woman bearing her seventh or eight child than in a primipara. Mr. Paramore's theory of the increased intra-abdominal pressure, due to powerful and unstretched abdominal muscles causing serious interference with the circulation of blood in both the liver and kidneys and thus impairing their functions, fits the facts far better. Even if the existence of increased intra-abdominal pressure in later pregnancy can be disproved experimentally, could there not be an alternative explanation of the impeded liver circulation—namely, that in pregnancy? One of the changes—not mentioned in Dr. Theobald's list—is the broadening of the base of the chest and the flattening of the diaphragm and a limiting of the up and down movements of the diaphragm. These effects would be greater in proportion as the abdominal muscles were powerful, as in primiparæ, or in proportion as the abdomen were bound in by tight lacing, as in unmarried pregnant women for purposes of concealing their condition.

Thus the important suction action of the diaphragm on the contents of the great abdominal veins would be much diminished and the circulation in the liver and kidneys impeded and their functions impaired. Doubtless, the most important result of such impairment of liver function would be the loss of the detoxicating power.

I am, Sir, yours faithfully,

Bridlington, June 8th, 1930. P. D. H. CHAPMAN.

To the Editor of THE LANCET.

SIR,—Whether Dr. Theobald's conception of eclampsia has been rendered more acceptable by his letter in your issue of to-day (p. 1264) seems to me questionable. I must confess I am not sure now whether he believes the fits are due to toxins of intestinal origin or not. He says that when the liver fails toxins absorbed from the gut enter the general circulation and poison the tissues of the body—"the kidneys as well as the heart." It would thus be reasonable to believe that they poison the brain and even thus produce the convulsions; but Dr. Theobald does not say so, and a definite statement would have helped. His idea that "the fits are probably caused by a sudden drop in the level of the blood-sugar associated with a hypo-calcæmia" (p. 1119) still simmers in the mind.

And especially is this so since, according to his letter, these toxins which poison the kidneys as well as the heart do not apparently poison the liver—at least, they do not occasion the hepatic failure. The liver "fails because the fœtus requires 8 g. of calcium, and relatively large supplies of sugar, iron, and iodine . . . ." (p. 1264)—which suggests an inability of the liver to comply with fœtal demands. But if the fœtal demands should become too great for the mother, fœtal atrophy, not a maternal disaster, should occur. The view put forward in the paper is more reasonable: in that Dr. Theobald attributed the hepatic failure in part to toxins absorbed from the gut. "The liver, carrying out metabolic functions for both mother and fœtus and overwhelmed by an excess of toxins, fails . . . ." (p. 1119). But now, Dr. Theobald not only repudiates or neglects the possible play of these intestinal toxins on the liver, which he has declared are being absorbed in excess; he also denies that increase of work by the liver has anything to do with its failure—which seems incompatible with the conception that its failure is due to fœtal demands. To the question, "whether the failure of the liver is due to overwork, I will answer in the negative" (p. 1264).

In view of Dr. Chalmers's letter and the statement that the intestinal tract of Chinese is swarming with all sorts of unwholesome bodies, coupled with the further statement of the absence of eclampsia amongst these people, it was perhaps well to discount the supposed rôle of intestinal toxins in the causation of eclampsia. The conception creates the difficulty to which Dr. Chalmers referred—that if eclampsia is due to "a breakdown in the defensive barrier to intestinal toxins . . . . such a condition might conceivably arise apart from pregnancy" (p. 1209). Dr. Theobald gets over this difficulty by attributing the failure of the liver to the absorption by the fœtus of calcium. But if that be so, how is it that in China where osteomalacia is common, eclampsia is rare? How is it that in hydatidiform mole, in which there is no fœtus, the liability to the toxæmias of pregnancy and even eclampsia is increased? How is it that in hydramnios the same effect is produced? Are we to believe that the sudden or abrupt distension of the uterus with blood—in concealed accidental hæmorrhage—produces eclampsia by robbing the maternal system suddenly of calcium—when a venesection in the arm may save an eclamptic?

And if a loss of calcium—or an exaggerated absorption of calcium by the fœtus—is the cause of the hepatic failure, why not attribute the failure of the kidneys and that of the heart to the same change? According to Dr. Theobald, the kidneys and the heart are damaged by toxins: but Stroganoff seems to have taught that it is the violence of the fits which damages the heart—during a fit the peripheral resistance is enormously increased, and according to Stroganoff it is each fit which renders the heart worse.[1] It is the physical strain, not a chemical blood change, which in eclampsia damages the heart. In the same way are the kidneys physically damaged by the fits, being rendered worse. The liver is equally involved in the damaging compressions occasioned by the fits. Similarly, it is the physical changes produced by pregnancy, of less intensity but of like nature, which initiate the visceral disturbance. Such a view, naturally enough, must be repugnant to Dr. Theobald; but it is one which a study of some years has done nothing but demonstrate its truth. For Dr. Theobald, the pressure in the abdomen is not increased in pregnancy. One reason for this, from his letter, is plain: "I ought to have said," says he, "that my observations on the pressure in the abdomen were made with the woman flat on her back and under anæsthesia" (p. 1264). What a conception

[1] Jour. Obst. and Gynæc. Brit. Emp., 1923, xxx. See p. 12.

of the intra-abdominal pressure does this aside portray! Naturally, if one anæsthetises the individual, even if the abdominal wall muscles do not become atonic, their tone is greatly diminished. How, from such a base, Dr. Theobald can state that in the active pregnant woman, even during rest—even during sleep, which has not the same effect as anæsthesia—the intra-abdominal pressure is less than atmospheric, and is not increased by pregnancy, surpasses my comprehension. Has Dr. Theobald considered the effect of muscle tone? Does he know that when striated muscle is actively elongated (as, for example, in the case of the abdominal wall and thoracic diaphragm by rapid distension of the abdomen), its tone becomes greater?

I told Dr. Theobald he had burnt his boats: he answers he has built a bridge. But its foundations are incomplete, and its structure contains contradictions. It is a bridge over which scientific thought cannot pass; nor does it seem to be one by which the eclamptic woman may be saved. Even though it should be true that "the injection of saline or air" into the udder of cows affected with *l'éclampsie vitulaire* (as Delmar called it)—a condition in the cow which resembles very closely eclampsia in man, as indeed Dr. Theobald tells us (p. 1264)—should raise the blood-calcium, that is not the reason why the procedure cures the animal. The distension of the udder with air in affected animals has a more subtle effect than that, one which veterinarians, as far as I am aware, have not yet fathomed.

I am, Sir, yours faithfully.

R. H. PARAMORE, F.R.C.S. Eng.

Rugby, June 7th, 1930.

CHEMICAL TESTS OF PANCREATIC EFFICIENCY.

To the Editor of THE LANCET.

SIR,—I think that no one, and least of all those who have had much experience of pancreatic affections, will disagree with Dr. Harrison's statement that there is no specific chemical test for pancreatic efficiency, or dispute his conclusion that the functional tests at present available are frequently equivocal. But this is equally true of chemical tests for the functional efficiency of other organs, and is an inevitable result of the interdependence of the chemical changes which go on in the body. The functions of the pancreas in metabolism, although highly specialised, are so intimately bound up with those of other organs that a sharp differentiation is difficult in practice, and, as a consequence, a diagnosis of disease of the gland can usually be arrived at only by considering the results of as varied and comprehensive a series of investigations as possible in the light of all the available clinical data, as I pointed out many years ago.

It is remarkable that glycosuria and hyperglycæmia are so rarely met with in pancreatic affections, and then mainly in acute lesions and chronic disease involving the whole gland. This may be due, as Dr. Harrison suggests, to a large reserve power, or may arise from other causes, but the absence of these signs in the less acute and more limited conditions does not necessarily mean that the storage and utilisation of carbohydrate are being carried out in a normal manner, in fact, it is exceedingly likely they are not, and that intermediate products of imperfect carbohydrate metabolism appear in the blood and are excreted in the urine in such circumstances. These intermediate products, being of the nature of dextrins, would not react to the ordinary tests for sugar, and would consequently escape detection unless they were specially sought. The detection and estimation of such dextrin-like bodies is the basis of the test with which my name is associated, and, although Dr. Harrison does not apparently use it, I can assure him it is still being regularly employed, in its quantitative form (THE LANCET, 1927, ii., 1386), by other observers as an aid to diagnosis and treatment. Originally devised simply to assist in the clinical differentiation of impacted gall-stones in the common bile duct from malignant disease of the head of the pancreas, it was subsequently found to be helpful in the detection of inflammatory affections of the pancreas arising from other causes, but it was not until a "positive reaction" was proved to be dependent upon the presence of an excess of dextrins in the urine, and a quantitative method for estimating them was contrived, that its uses and limitations were fully defined. It was never claimed to be pathognomonic, and experience has shown that dextrinuria, like glycosuria, may arise from other causes than disease of the pancreas, but, as dextrins appear in the urine at a much earlier stage than dextrose, their detection affords a means for recognising defects of carbohydrate metabolism while they are still of a comparatively mild type. Dextrinuria is also of importance in treatment, since it is an indication that the metabolic powers of the patient are inadequate to deal with the diet he is taking. This is well seen in diabetics who are being treated with insulin, for a dextrinuria usually persists for some time after all traces of sugar have disappeared from the urine, and reappears again before hyperglycæmia and glycosuria develop if the dose of insulin is reduced, or the diet is increased, in such a way as to over-tax the patient's tolerance to a slight extent.

I am, Sir, yours faithfully,

P. J. CAMMIDGE.

Nottingham-place, W., June 16th, 1930.

THE ROTUNDA HOSPITAL.

To the Editor of THE LANCET.

SIR,—I am afraid that your annotation (p. 1301) on the work of the Rotunda Hospital, although accurate, may be a trifle misleading. You mention that there were 963 obstetrical operations performed. As this includes 602 perineorrhaphies, 2 cases of spinal anæsthesia, 11 of Gwathmey anæsthesia, 3 of underpinning the cord, 3 sterilisation (done at the same time as Cæsarean section), 2 venesection, 1 puerperal douche, and 5 Hobbs's treatment, this leaves 333 to be accounted for. These are made up of:—

Forceps	141	Version	20
Induction ..	123	Other manœuvres ..	15
Cæsarean section ..	34		

I feel that the Rotunda Hospital can still claim to be in the forefront of those who believe in conservative methods. I am, Sir, yours faithfully,

BETHEL SOLOMONS,

June 16th, 1930. Master, Rotunda Hospital, Dublin.

LEFT INFRAMAMMARY PAIN.

To the Editor of THE LANCET.

SIR,—Dr. Doris Baker's paper in your issue of June 14th is a welcome addition to communications which seek to differentiate the causes of pain in the region of the left breast. If it assists in preventing those suffering in this manner from being put to bed for six weeks, and from being labelled angina pectoris—one of the terms so terrifying to the public—it will have served a most useful purpose.

Dr. Baker has not attempted to give an explanation of the mode of production of this pain. If a detailed investigation of the submammary region is made, one or more small areas of maximal tenderness is found in the fifth or sixth intercostal space. Pressure here accentuates the pain, induces recognition as *the* pain, and if continued causes radiations of pain in the directions and areas peculiar to that individual. I described some of these areas (THE LANCET, 1921, ii., 1257) under the title the Origin of the Anginal Syndrome, contending that these pains are of muscular origin. In the Lumleian

lectures, 1927 (THE LANCET, 1927, i., 637, 749, 857), I brought forward instances of these muscular pains in various conditions—trauma, pleurisy, gastric distension, static, and functional, &c. A recognition of diversity of causes producing similar symptoms helps to establish a pathology and to indicate a treatment.

The fifth or sixth interchondral space, whichever is the highest space containing an interchondral balk and joint, acts by virtue of that joint, as the hinge of the movement of the lower thoracic ribs 6, 7, and 8 on the upper, hence that intercostal muscle is liable to strain. Such stress arises in the upper thoracic type of breathing seen in functional cases, and in certain cases of failing heart, as well as in the eversion of the lower thorax coincident with affections of the stomach and probably of other organs—e.g., the œsophagus. Strain on this muscle is also caused by static conditions. Lateral spinal curvature, the convexity being to the left in the mid-dorsal region, opens the intercostal space and stretches the muscle. Conditions in which the shoulders are held backwards diminish the concavity of antero-posterior curve of the lower thoracic vertebræ and open the space anteriorly. The former variation frequently follows changes in the level of the crests of the ilium from whatever cause, and the latter such conditions as pregnancy, over-nutrition, myxœdema.

Excessive contraction of an intercostal muscle will also occur in pleurisy, and in the neighbourhood of torn muscle-fibres. If such is in this area pain will be as described. Starting a car has been responsible for several cases, no doubt of rupture of muscle followed by intense pain radiating widely.

Bromide relieves the cases of psychic pain and exaltation of reflexes. Recognition and treatment of the psychological factor requires more than reassurance, and without such fuller mental treatment the abnormal upper chest over-action and irregularity will not be restored to the normal. Amelioration sometimes follows re-education of diaphragmatic action. Treatment of the stomach to obviate flatulence, as by creosote or small doses of calomel and rhubarb and soda, is most valuable. The static cases yield favourably to measures which restore the natural posture—shoes, dieting, thyroid extract, &c. Pleuritic pains, acute or subacute, and trauma yield to measures restricting movement or assisting the action of the muscle.

The most troublesome type to treat is the individual about 50–63. There is no functional element except anxiety to know that the heart is not the cause. These people have reached the period in which calcification of costal cartilages has commenced, entailing more work by interchondral and intercostal muscles. The pain lasts for 18 months to 3 years and then disappears simultaneously with the alteration of the mode of breathing from the thoracic to the abdominal. A chest with a broad epigastric angle is characteristic of this type. Massage to the intercostal muscles is helpful. Successful treatment based on a theory derived from anatomical and physiological concepts goes some way to establishing the correctness of the theory, and I am firmly convinced that the immediate origin of the pain lies in the muscle.

I think Dr. Baker's summary and opinions on treatment are too pessimistic.

I am, Sir, yours faithfully,

CHARLTON BRISCOE.

Harley-street, W., June 18th, 1930.

To the Editor of THE LANCET.

SIR,—The chief impressions I received from a perusal of Dr. Doris Baker's paper were (1) that a cardiological clinic is not the proper treatment centre for patients suffering from this condition, and (2) that the apparent limited amount of material for the study of this condition at these centres reflects a certain amount of credit on the diagnostic acumen of general practitioners.

Pain under the left breast, unassociated with any other symptom, subjective or objective, is the most common of all complaints of pain found in a consulting room (I am writing with the assistance of a carefully indexed study of symptomatology extending over many years), and in association with other symptoms ranks in frequency among the first three pain areas. The pain varies in intensity from a mild discomfort to all the manifestations of a mild primary angina pectoris, apart from situation. Hyperæsthesia is present in a certain number of cases, and the feeling of constriction in some, being due most probably to contraction of the intercostal muscles. Just as pain in the lumbar region is usually associated in the lay mind with kidney trouble, so pain in this region is associated with heart trouble, and that in part may explain its high frequency among patients, but we should unfailingly look for abdominal lesions. It has been found as the outstanding complaint in diseases of the gall-bladder, appendix, uterus, and ovary, and cured by proper surgical interference.

The relationship between hyperæsthesia and gross abdominal lesion, unfortunately, does not appear to be constant, as it has been found absent in some with lesion and present in some where no lesion has ever manifested itself. Its chief associated symptom is constipation, and that may explain why it is more common in women than in men, because constipation is more common in women than in men. It is a mistake to say that "treatment is unsatisfactory." It is all a question of correct diagnosis, for it is found in association with so many different causes, but, failing evidence of definite disease, the most efficacious treatment is "Mist. alba." Why this should be so effective as compared with other and more elegant preparations I do not know. It is especially effective in those cases where the patient states that the habits have been regular.

While it may be that the pain in all cases can only be explained by a complicated reflex mechanism, it seems to be a good rule of thumb in the majority of cases to regard it as being due to the mechanical drag of a loaded bowel. There is one other point: it is necessary to reassure the patient in regard to her heart, but as the lady is likely to have discussed the trouble with her friends, the "rheumatism round the heart" diagnosis of the old family doctor is not without its good points; it sounds much nicer, and is more flattering than "constipation," and is just as safe.

I am, Sir, yours faithfully,

Halifax, June 17th, 1930. A. GARVIE.

GAS-OXYGEN AS A ROUTINE ANÆSTHETIC.

To the Editor of THE LANCET.

SIR,—I am much interested in Dr. A. H. Macklin's report in your issue of June 7th (p. 1231) on the routine use of gas and oxygen for major operative work. There is no doubt that he has realised the importance of using an efficient machine. I see that he is attempting to devise a facepiece which will deal satisfactorily with edentulous cases. There is no need for him to trouble to do that, as if he will get a McCardie or London pattern airway and use it to keep the nose from coming into contact with the chin, and then cut a piece of Gamgee tissue of suitable size with a hole for the nose and mouth, thoroughly wet it with water, and then use the facepiece he has, inflated so as to be very soft, there is very little difficulty in maintaining an airtight contact. McKesson himself leaves the dentures (if full upper and lower) in, and I have seen for myself, over in the States, that this method answers very well. Of course, in this country it would not be allowed us; the ward sisters and theatre staff would be worried to death if they caught a patient in the theatre with loose teeth. I agree with Dr. Macklin's opinion of the Boyle apparatus,

about which I have already expressed my opinion.[1] There is no doubt that when the public realise the advantages, to themselves, of gas anæsthesia the present opposition to it will speedily break down.

I am, Sir, yours faithfully,

E. J. CHAMBERS,
June 13th, 1930. Anæsthetist to Rotherham Hospital.

CÆSAREAN SECTION UNDER SPINAL ANÆSTHESIA.

To the Editor of THE LANCET.

SIR,—The communication in your issue of May 10th on Cæsarean section under spinal anæsthesia prompts me to the following comment. A patient suffering from congestive heart failure is clearly unfitted to withstand inhalation anæsthesia, but in my experience rachianæsthesia has not been without its ill-effects on the circulation. Under these circumstances local anæsthesia seems to me the method of choice, and by local infiltration with 1 per cent. novocain together with block of the lower intercostal nerves I have been able to carry out the operation with ease. The uterus is, of course, quite insensitive to cutting and handling.—I am, Sir, yours faithfully,

L. F. O'SHAUGHNESSY, F.R.C.S. Eng.,
Sudan Medical Service.
Omdurman, May 27th, 1930.

Obituary.

ROBERT McKENZIE JOHNSTON, M.D., F.R.C.S. EDIN.,

CONSULTING SURGEON TO THE EAR AND THROAT DEPARTMENT, EDINBURGH ROYAL INFIRMARY.

WE regret to record the death of Dr. McKenzie Johnston, the well-known Edinburgh surgeon, which occurred on Sunday, June 1st, at a nursing home, in the seventy-fourth year of his age.

Robert McKenzie Johnston was born in Edinburgh in 1856, the son of a surgeon in the H.E.I.C., whose other sons included the distinguished Scottish lawyer, Lord Johnston, and Sir Duncan Johnston, of the Ordnance Survey. Robert was educated at Clifton and the Edinburgh Academy, entered the University for his medical training, and graduated in medicine in 1881, proceeding to the M.D. in 1883, after holding the post of resident physician at the Royal Infirmary. He obtained the F.R.C.S. Edin. in the following year, and went into general practice. But in 1890, having in the meantime taken special interest in diseases of the ear, nose, and throat, he was appointed assistant surgeon to the Royal Infirmary, where a special department of laryngology had been formed under the late Prof. Peter McBride. The department was then quite a small one, but it gradually developed, more accommodation was found for patients, with a complete out-patient department and lecture theatre, and by 1903, when McKenzie Johnston became full surgeon, the annex to the infirmary was completely up to date. It has since regularly received all necessary complements to its utility, for McKenzie Johnston was extremely well informed on the technical side of his specialty. When ill-health led to his cessation of work in 1906, he was established by practical performance as a professional leader. He did not, however, allow the break in his career to become a tragedy, and although he resigned his hospital and university appointments, he shortly afterwards returned to work, when other organisations and institutions benefited from his freer energies. He had joined the board of management of the Infirmary in 1907, and for 12 years he was manager of the institution, where his services proved of the utmost value. He was also an indefatigable member of the University Court. At the Royal College of Surgeons he acted for a time as secretary, and when in 1917 he was elected President it was felt that he had obtained the eminent professional position as a reward alike of industry, capacity, and learning.

We owe to Sir Leslie Mackenzie the following appreciation of Dr. McKenzie Johnston's character:—

"At once a man of culture and of serious views on all serious questions, he was tenacious of his opinions, yet gracious in argument. He was fearless and ready in action, yet not insistent or aggressive. He was, from the standpoint of many younger medical 'reformers,' very conservative. But then he showed in his whole dealings the deeply rooted sense of honour that made him a force in the profession and in all the public bodies on which he served—the Royal Infirmary, Fettes College, the University Court, and others. It was in the nature of things that such a man should come into the Presidentship of the College of Surgeons. He carried into all his life a reverence for the past, but his mind was always subtle and alert and, if he did need to be persuaded of the value of new changes, he 'played the game' when his persuasion was complete. He took all his work with grave seriousness, and that was, no doubt, the main secret of his great influence. His quiet, undemonstrative manner gave no immediate indication of his personal force but, once known, McKenzie Johnston was seen to be a man of intense grip and invincible will. He leaves a gap in the life of Edinburgh, perhaps we should say in the life of the 'older Edinburgh,' when the conditions were still simple enough to enable a cultured doctor to take his share in civil administration as well as in his professional specialty. Edinburgh is fortunate in having had many such men; but Johnston was one of the best."

In addition to the work done for the Infirmary, the College of Surgeons, and the University, McKenzie Johnston gave much time and thought to the affairs of the British Medical Association, being for two periods on the Council and an assiduous member of the Building Sub-Committee which over 20 years ago took over the rebuilding of the Strand premises of the Association. He was also a governor of Fettes College, and a member of the Royal Company of Archers.

Dr. Johnston married a daughter of the late Mr. Henry Younger, of Benmore, Argyllshire, by whom he was predeceased, while he is survived by three sons and a daughter.

ANGHEL GASTER, M.D. BUCHAREST, M.R.C.P. LOND.

Dr. Anghel Gaster, whose death at the age of 66 was announced in a recent issue of THE LANCET, died at his residence, 33, Devonshire-place, W., on May 31st.

Anghel Gaster was born at Bucharest and received his general and medical education in his native city. His father was a man of importance in Bucharest, and one of his brothers, who entered the Jewish priesthood, was well known as an ethnologist and a learned student of divinity. Anghel Gaster, after obtaining his medical degree at Bucharest University, became resident at one of the chief hospitals in the city, where he began to study closely diseases of the chest and the therapeutics of tuberculosis. In the year in which he graduated in medicine, the Rev. Dr. Moses Gaster, the theologian brother, came to England to take up a high appointment in the Jewish Church, and Anghel Gaster, after post-graduate study in Paris and Berlin, joined him in London. He obtained the diploma of M.R.C.P. Lond. in 1891, held a resident appointment in the City of London Chest Hospital, and then went into general practice in a characteristic manner—that is to say, he worked in Hampstead and in the East End of London simultaneously, devoting a large proportion of his time to gratuitous labour among the poor in Stepney and the adjoining districts. He was equally successful

[1] Brit. Med. Jour., 1929, i., 1099.

in both classes of practice, his sterling qualities of character being backed by high professional skill. In 1896, having become a naturalised British subject, he married Miss Leah Mocatta, and shortly afterwards his position both as doctor and philanthropist was consolidated by the leading part which he played in the foundation of the London Jewish Hospital in Stepney. Of this hospital he was treasurer from the outset in association with his wife, and in the 20 years of the life of the institution it has developed from 10 to over 100 beds.

Throughout the war he was commanding officer of the Tudor House Military Hospital in Hampstead, while he also held appointments in Kensington, at the Kensington and Fulham General Hospital, and in Hampstead as medical officer to the Baroness de Hirsch Convalescent Home.

One of his colleagues on the staff of the London Jewish Hospital sends us a warm appreciation of Gaster's work there. "As a physician," he writes, "he had charge of both in-patients and out-patients, and the latter flocked to him in great number, while he never spared himself. His fluency in many languages was here of great value; it may be said truly that he was loved by his patients, and he is deeply regretted by his colleagues and many friends."

THE LATE DR. COOPER PATTIN.

Dr. Soothill, the medical officer of health for Norwich, has sent us the following tribute to the qualities of his predecessor. Of Dr. Cooper Pattin he says: "He was a leader of thought in many ways, the cubicle block at the Norwich Isolation Hospital being one of the first in the country, and the inclusion of school-children of 10 years and 13 years of age in the routine groups for school medical inspection being an unusual advance. In fact, starting from the small beginnings usual in those times, he left a public health department which could compare favourably with any authority of similar size in the country, while the results, as shown by the diminishing death-rates published in his last annual report, testify to the quality of the work done. As the figures are of general public health interest, it is as well to mention them here. Dr. Pattin said: 'It is of interest to myself to state that in my first year of service and in my last..... the corrected death-rates (were) 18·1 and 10·4 per 1000. The infantile mortality-rates, 196·25 and 58·1 per 1000 births. The death-rates from tuberculous diseases, 2·4 and 1·1 per 1000. The notifications of enteric (typhoid) fever, 314—with 36 deaths and 14 with 2 deaths—of puerperal fever, 15 with 10 deaths and 9 with 3 deaths.'

"Dr. Pattin was a fluent and witty speaker with a great fund of humour, but was not at all shy of making the same jest repeatedly in public—and it always 'went down.' He labelled himself an improvident philosopher, stated that he had lived more for the life he had enjoyed than the livelihood, and was indeed generous beyond his means, while his will is concerned with a scholarship for medical education. All the arts and sciences were discussed with gusto, and in many cases with close knowledge, while he thoroughly enjoyed a game of bridge or bowls. He never appeared flurried; he was shrewd, able, upright, and advanced a long way in Norwich along the path of the education of the 'vested interests' to the point of view that improved conditions are to their own advantage."

LONDON JEWISH HOSPITAL MEDICAL SOCIETY.—A general meeting of this society was held at the London Jewish Hospital on June 12th, the President, Dr. J. Burford, in the chair. The following officers were elected for the ensuing year: President, Dr. L. Mandel; vice-president, Mr. M. Sourasky; treasurer, Dr. L. Turiansky; hon. clinical secretary, Dr. H. Avery; hon. general secretary, Dr. L. Phillips; committee, Dr. Appel, Dr. Dywien, Dr. Kaplin, Dr. D. Krestin, Dr. Robinowitz, Dr. Rosenzvit, and Mr. A. Sorsby.

Medical News.

UNIVERSITY OF OXFORD.—Patrick Corbett Mallam, B.M., has been elected to a Schorstein research fellowship.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—An ordinary meeting of the Council was held on June 12th, with Lord Moynihan, the President, in the chair.

Diplomas of Fellowship were granted to the following candidates who were successful at the recent examination:—

Charles Edward Kindersley, St. Bart.'s; Arnold Guy Harsant, London; Philippa Parry Martin, Univ. Coll.; Henry Richard Rishworth, St. Mary's and London; Louis Amos Bennett, Otago and St. Bart.'s; Arthur Elliot Smith, Univ. College; Terence Edward Cawthorne, King's College; Thomas Smith Donovan, Birmingham; Arthur Edgar De Chazal, Univ. College; Frederick James Theodore Foenander, Ceylon and Middlesex; John Giddings Milner, St. Bart.'s; John Geoffrey Yates Bell, King's College; Arthur Charles Copley and James Rudd Ratcliffe, Guy's; James Cosbie Ross, Liverpool and Guy's; Thomas Holmes Sellors, Oxford and Middlesex; Gavin Hamilton Livingstone and Hubert Lyon-Campbell Wood, King's College; Hugh Osmund Blauvelt, Dalhousie and London; Arthur Capel Herbert Bell, St. Bart.'s; Robert Rutherford, King's College; Mahmoud Ismail Ashmawi, Cairo and St. Bart.'s; Archie Murrell Acheson Moore and John Foster, London; Arthur Espie Porritt, Otago and St. Mary's; Kenneth Harold Watkins, Manchester and Guy's; Henry Hamilton Stewart, St. Thomas's; David William Currie, Leeds and St. Bart.'s; Vencatachari Srinivasan, St. Bart.'s; Hermon Taylor, Camb. and St. Bart.'s; Thomas Giblin, Melbourne and Guy's; John Gordon Sandrey, Sydney and St. Bart.'s; Robert Henry Hadley, Melbourne and London; Shantilal Jamnadas Mehta, St. Bart.'s; Sangham Lal, London; William Donald Bedford, Leeds and London; Myles Landseer Formby, Adelaide and Guy's; Robert Grainger, Belfast and St. Bart.'s; Victor John Kinsella, Sydney and Guy's; Eric Ian Alan Macdonald, Otago and St. Bart.'s; John Mark, Otago and Guy's; Robert John Cecil Maxwell, Belfast and St. Bart.'s; and Hector Hamilton Stewart, Melbourne and St. Bart.'s.

Diplomas of Membership were granted to: Mabel Eileen Grace, Joyce MacInnes, Ruth Milne, and Helen Elizabeth Rodway (Royal Free), who had previously passed the final examinations in medicine, surgery, and midwifery of the Examining Board in England and had now complied with the regulations.

At the primary examination for the Fellowship, held from June 3rd to 14th, for which 158 candidates presented themselves, 54 were approved. The following are the names and schools of the successful candidates:—

S. Ahmad, M.B., Punjab and London; G. L. Alexander, M.B., Edinburgh; D. R. Bharucha, M.B., Bombay, King's Col., and Middlesex; R. W. Billington, Cambridge and Middlesex; V. G. Borgaonkar, M.B., Bombay and London; G. H. Brandis, M.B., Melbourne and King's Coll.; M. Coleman, M.B., Univ. Coll.; T. G. B. Crawford, M.B., Trin. Coll., Dublin; A. W. Cubitt, B.M., Oxford and King's Coll.; M. P. Ellis, M.R.C.S., Univ. Coll.; B. E. Fernando, L.M.S., Ceylon, Middlesex, and King's Coll.; D. I. Fitzpatrick, M.B., Melbourne and King's Coll.; G. H. V. Froggatt, M.R.C.S., Sheffield and Middlesex; E. Galinsky, Univ. Coll.; P. H. R. Ghey, Cambridge; B. Gilbert, St. Thomas's; A. El S. Handousa, M.R.C.S., Cairo and St. Mary's; J. B. Harman, Cambridge and St. Thomas's; B. P. Harris, Cambridge and Middlesex; G. J. Hollis, M.R.C.S., Guy's; J. F. Jarvis, King's Coll.; A. N. Jones, M.B., Liverpool and Middlesex; K. D. Keele, St. Bart.'s; T. King, M.B., Melbourne and King's Coll.; R. Lal, M.B., Lucknow and Middlesex; J. M. Leggate, M.B., Liverpool; A. H. Lendon, M.B., Adelaide; F. R. Leonard, M.B., Otago and King's Coll.; H. G. Letcher, M.B., Adelaide, King's Coll., and Middlesex; A. L. Light, M.B., Leeds and Middlesex; S. N. Lytle, M.B., Belfast; E. G. MacMahon, M.B., Sydney, Middlesex, and St. Mary's; K. M. Masani, M.B., Bombay and Middlesex; Mary H. Mayeur, Lond. Sch. Medicine; D. M. Mitchell, M.B., Otago; N. St. C. Mulhearn, M.B., Sydney and Middlesex; E. G. Murphy, Univ. Coll.; J. H. North, M.B., Otago and King's Coll.; J. O'Donnell, M.B., Leeds; J. Penry, M.R.C.S., St. Mary's and King's Coll.; G. Qvist, Univ. Coll.; K. C. T. Rawle, M.B., Sydney, King's Coll., and St. Mary's; R. V. Rickard, M.B., Sydney, King's Coll., and St. Mary's; L. N. Ross, M.B., Belfast; J. E. Semple, M.B., St. Thomas's; E. J. Smith, King's Coll.; B. R. Sworn, M.B., St. Thomas's; G. R. A. Syme, M.B., Melbourne, St. Mary's and King's Coll.; G. G. Talbot, M.B., Otago and King's Coll.; W. H. Tandy, M.R.C.S., Birmingham and Middlesex; Lilian E. Tracey, Lond Sch. Medicine; E. N. Wardle, M.B., Liverpool; J. C. F. L. Williamson, M.B., Cambridge and St. Bart.'s; I. Zieve, Cape, St. Mary's, and King's Coll.

Mr. Max Page, surgeon to St. Thomas's Hospital, was elected a member of the court of examiners for five years in the vacancy occasioned by the retirement of Mr. Graham Simpson, of Sheffield. The following examiners were elected for the ensuing year:—

Dental Surgery.—(Surgical Section)—L. Bathe Rawling, H. S. Clogg, T. P. Legg, Russell J. Howard, Gwynne

Williams, John Murray, C. E. Shattock, and Cecil P. G. Wakeley.

Examiners for the Fellowship.—(Anatomy)—P. N. B. Odgers, William Wright, J. Ernest Frazer, and J. Basil Hume; (Physiology)—H. E. Roaf, C. A. Lovatt Evans, R. J. S. McDowall, and John Mellanby.

Conjoint Examining Board.—(Elementary Biology)—James P. Hill and T. J. Evans; (Anatomy)—R. Bramble Green, W. E. Le Gros Clark, and H. A. Harris; (Physiology)—E. B. Verney and Hamilton Hartridge; (Midwifery)—Clifford White, T. B. Davies, A. W. Bourne, and Sidney Forsdike.

Diploma in Public Health.—(Part I.)—John Eyre; (Part II.)—C. W. Hutt.

Diploma in Tropical Medicine and Hygiene.—(Pathology and Tropical Medicine)—David Harvey.

Tropical Medicine and Surgery.—G. Carmichael Low.

Diploma in Ophthalmic Medicine and Surgery.—(Part I.)—H. Willoughby Lyle and W. S. Duke-Elder; (Part II.)—R. Affleck Greeves.

Diploma in Psychological Medicine.—J. G. Greenfield.

Diploma in Laryngology and Otology.—(Part I.)—W. M. Mollison and Norman Patterson; (Part II.)—W. G. Howarth.

Diploma in Gynæcology and Obstetrics.—J. D. Barris.

Dr. Harold Dew was elected a Hunterian Professor for the ensuing year, and will deliver a lecture on Hydatid Disease—some Interesting Complications, on Thursday, July 10th, at 2.45 P.M.

It was decided to proceed with the arrangements for holding the primary examination in anatomy and physiology for the Fellowship in Canada, at Montreal, and Prof. William Wright and Prof. Lovatt Evans were appointed to conduct the examination.

Sir Holburt Waring was appointed to represent the College at the ceremonies of the inauguration of the buildings of the University of Brussels and of the School of Medicine from June 23rd to 25th.

UNIVERSITY OF BRISTOL.—At recent examinations the following candidates were successful:—

CH.M.

Robert Victor Cooke.

FINAL EXAMINATION FOR M.B., CH.B.

Part I.—K. P. Beaubrun, L. C. Holland, and (completing examination) A. J. B. Miall.

Part II.—With Second Class Honours: *J. F. Coates and †G. F. Langley. *Pass*: H. F. G. Corfield, R. D. Jones, R. A. Lattey, R. P. Lucas, H. M. Strover, and (completing examination) R. M. Norman.

* Distinction in Medicine and Obstetrics.
† Distinction in Medicine and Public Health.

FINAL EXAMINATION FOR B.D.S.

Pass.—Muriel E. S. Cosh and William Forsyth.

FINAL EXAMINATION FOR L.D.S.

A. N. Moon, T. A. Satchwell, C. G. Westlake, and Idwal W. Williams.

D.P.H.

Part II.—W. W. S. Sharpe.

UNIVERSITY OF LONDON: *University College.*—Mr. R. K. Cannan has resigned his lectureship in biochemistry on appointment to the chair of chemistry in New York University, and Mr. G. F. Marrian has been appointed lecturer in his place.

UNIVERSITY OF DURHAM.—The honorary degree of D.C.L. is to be conferred on Lieut.-General H. B. Fawcus, Director-General of the Army Medical Services.

EPSOM COLLEGE: *St. Anne's Scholarship.*—The Council of Epsom College will shortly elect a girl to a St. Anne's scholarship of £120 a year. Candidates must be at least 9 and not more than 12 years old on July 30th, and must be orphan daughters of medical men who have been for not less than five years in independent practice in England or Wales. Application must be made by July 3rd on a form to be obtained from the secretary of the College, at 49, Bedford-square, W.C. 1.

PHYSIOLOGICAL SOCIETY.—This society is holding a meeting at 2.30 P.M. on Saturday, June 21st, at University College, London, with Sir Charles Sherrington, O.M., in the chair. At 3.30 Dr. Georges Bourguignon will demonstrate the technique of chronaxie measurements on human subjects and Dr. Léon Brillouin will explain his new apparatus for making such measurements. These demonstrations will be preceded (at 2.30 P.M.) and followed (from 5.15 to 6.15) by a discussion on Chronaxie and Central Nervous Activity. The speakers will be Prof. Louis Lapicque, Dr. Henri Laugier, Dr. Catherine Veil, and Prof. Henri Fredericq, and members of the medical profession are invited to attend. In the evening a dinner in honour of Sir Edward Sharpey-Schafer will be held at the Trocadero Restaurant.

SOCIETY OF APOTHECARIES OF LONDON.—Mr. Reginald Silby Lewis, LL.B., has been appointed medical registrar to this society.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.—At a recent meeting of the Faculty the following were elected to honorary Fellowships: Dr. Robert Muir, professor of bacteriology in the University of Glasgow; Dr. William Loudon Reid, formerly president of the Faculty; and Lieut.-Colonel Laurence Austine Waddell, I.M.S. (retd.).

ROYAL SUPPORT FOR HOSPITALS.—On Thursday last week the Prince of Wales visited Edinburgh in connexion with the bi-centenary of the Royal Infirmary. He first formally opened the Murray Home for wounded and invalided soldiers and sailors, and planted a commemorative tree. The home, which accommodates 20 residents, and contains a surgery and a sick room, has been provided at a cost of £22,000 under the will of the late Miss Helen Murray. The Prince then went to the Royal Infirmary, where he visited the wards, planted another commemorative tree, and after lunching with the City Council, made a speech supporting the appeal for £500,000 for an extension of the hospital.—On the same day Princess Mary opened an enlargement of the East Surrey Hospital at Redhill, and the Duke of York presided over a festival dinner at the Mansion House in support of the fund of £100,000 which is being raised for extensions to the Royal National Orthopædic Hospital, and for the provision of better equipment and the creation of a maintenance fund. There are 1000 child patients on the waiting-list.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.—The forty-eighth annual dinner of this society was held at the Trocadero Restaurant, London, on June 12th, and was well attended. The chair was taken by Dr. J. F. Halls-Dally, who gave an interesting historical account of the origin of the society, whose first two dinners were held at the Star and Garter Hotel, Richmond. Their membership he said, now numbered 360 and 32 new members had been added during the year. Lord Moynihan congratulated the society on having held aloof from amalgamation in the Royal Society of Medicine, an advantage, he suggested, shared by both parties. Medical London, he remarked, had been behind the provinces in the acceptance of Listerism and generally in progress and enlightenment. With undergraduates it had been successful; the schools had taught them all the medicine and more than all the surgery that they knew, and had inspired them with the right principles of conduct; but although the isolation of its several schools happily had now broken down London had not yet realised its opportunities for post-graduate medical teaching. He desired to see a great research centre at the Royal College of Surgeons with its home at Down in Charles Darwin's old house, and he looked to the foundation of an Academy of Medicine. Dr. A. Knyvett Gordon, proposing "Kindred Societies and Guests," offered the Agent-General for Queensland, who was chief guest, medical exports in the form of his neurasthenic patients to populate the broad spaces of the State, accepting in return the radium which he believed might be mined there. Sir Edward Macartney, in replying, admitted the mineral wealth of Queensland, but disclaimed a knowledge of the existence of radium, although he would willingly assist Dr. Gordon and his friends with a concession for obtaining it. Dr. P. Montague Smith, President of the Harveian Society of London, and Major Hugh Wakefield also replied, the latter with inimitable stories in Lancashire and Cockney vernacular. Sir Dennis Herbert proposed "The Chairman" in happy terms. Mr. Finlay Dunn, at the piano, entertained the company.

MATERNITY AND CHILD WELFARE.—A national conference on this subject will be held at Friends House, Euston-road, London, N.W., from July 1st to 3rd. At the opening meeting Dame Louise McIlroy will take the chair, Miss Susan Lawrence, M.P., Parliamentary Secretary to the Ministry of Health, will give a presidential address, and a debate on Infant and Pre-school Child Mortality will be opened by Dr. T. H. C. Stevenson, of the General Register Office. On the second day Mr. Neville Chamberlain, M.P., will take the chair, and the subject before the meeting will be the Relationship between Housing and Child Welfare, introduced by Sir John Robertson. In the afternoon Sir Robert Jones will preside at a session at which the two subjects of discussion will be the Relationship between the Orthopædic Clinics and Child Welfare Centres, opened by Dr. T. Hartley Martin, and the After-care of Non-notifiable Infectious Diseases, opened by Dr. K. H. Tallerman. On the evening of the same day Prof. S. J. Cowell will lecture on Present Research in Nutrition. On July 3rd the chairman will be Lady Lawrence, and the first debate, on the Care of the Pre-school Child, will be opened by Dr. G. C. M.

M'Gonigle, Dr. J. Middleton Martin, and Dr. H. W. Pooler. Among those contributing in the afternoon, when Sir Arthur Stanley will preside, will be Sir F. Truby King, who will speak on Progressive Developments in the Feeding and Care of Infants. At 5 P.M. Dr. J. A. Stephen will give his presidential address to the maternity and child welfare group of the Society of Medical Officers of Health. During and after the conference visits will be paid to child welfare centres of various kinds. Particulars may be had from Miss J. Halford, 117, Piccadilly, W. 1.—A post-graduate course in this subject will be held at various centres in London from Monday, June 30th, to Saturday, July 5th. It is being arranged in connexion with the annual meeting of the M. and C.W. group of the Society of Medical Officers of Health, but there will be a few vacancies for practitioners not in the public health service. Particulars may be had from the Fellowship of Medicine at 1, Wimpole-street, W. 1.

Medical Diary.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

THURSDAY, June 26th.—8.30 P.M., UROLOGY. Paper, Mr. Swift Joly: Cystoscopic Diathermy for Villous Growths of the Bladder.

FRIDAY and SATURDAY.—OTOLOGY: Summer Meeting at Nottingham. Papers have been promised by Dr. Muir Evans, Prof. Guido Guida, Dr. Densham, and Mr. Lowndes Yates. Cases and demonstrations by Mr. Alexander Tweedie, Mr. Bell Tawse, Mr. Sydney Scott, and Mr. George Wilkinson. Exhibition of mechanical and electrical aids to hearing. Discussion on the proceedings of the Committee for the Consideration of Hearing Tests.

LONDON CLINICAL SOCIETY.

TUESDAY, June 24th.—9 P.M. (at the London Temperance Hospital), Sir Robert Armstrong-Jones: The Evolution of the Human Mind. (Illustrated by lantern slides.) (Fifth annual Macalister Lecture.)

MEDICO-LEGAL SOCIETY.

THURSDAY, June 26th.—8.30 P.M. (at 11, Chandos-street, W.), Annual General Meeting. Prof. J. S. Haldane: Carbon Monoxide Poisoning.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, June 23rd, to SATURDAY, June 28th.—MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W., Special M.R.C.P. Lectures at 8.30 P.M. Tues. and Fri., Dr. W. J. Adie, Diseases of the Nervous System; NATIONAL HOSPITAL FOR DISEASES OF THE HEART, Westmoreland-street, W.: Mon., 2.15 P.M., Dr. Strickland Goodall, Demonstration in O.P. Department. No fee.—ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, W.: Thurs., 1.30 P.M., Mr. R. Y. Paton, Demonstration in O.P. Department. No fee.—BLACKFRIARS SKIN HOSPITAL, Blackfriars-road, S.E.: Afternoon Course, second week, Special Demonstration on Tuesday.—CHELSEA HOSPITAL FOR WOMEN, Arthur-street, S.W.: Second week of Course in Gynæcology, mornings and/or afternoons.—HOSPITAL FOR TROPICAL DISEASES, Gordon-street, W.C.: Second week of course, instruction from 11–12.30, 2–3.30 P.M.—PRINCE OF WALES'S GENERAL HOSPITAL, Tottenham, N. Intensive Course in Medicine and Surgery. Further particulars from the Fellowship of Medicine.

NATIONAL HOSPITAL, Queen-square, W.C.

MONDAY, June 23rd.—12 noon, Dr. Greenfield: Cerebro-spinal Fluid. 2 P.M., Dr. Riddoch: Out-patient Clinic. 3.30 P.M., Dr. Kinnier Wilson: Varieties of Peripheral Neuritis.

TUESDAY.—2 P.M., Dr. Walshe: Out-patient Clinic. 3.30 P.M., Dr. Grainger Stewart: Spinal Tumours and Compression Paraplegia.

THURSDAY.—2 P.M., Dr. Kinnier Wilson: Out-patient Clinic. 3.30 P.M., Dr. Gordon Holmes: Lesions of the Cerebellum.

FRIDAY.—12 noon, Dr. Purdon Martin: Anatomy and Physiology of the Nervous System. 2 P.M., Dr. Adie: Out-patient Clinic. 3.30 P.M., Dr. Walshe: Disorders of the Motor System.

ST. JOHN'S HOSPITAL DERMATOLOGICAL SOCIETY.

WEDNESDAY, June 25th.—4.15 P.M. (at St. John's Hospital, 49, Leicester-square, W.C.), Annual General Meeting and Cases.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.

MONDAY, June 23rd.—2.30 to 5 P.M.: Medical, Surgical, and Gynæcological Clinics. Operations.

TUESDAY.—2.30 to 5 P.M., Medical, Surgical, Ear, Nose and Throat Clinics. Operations.

WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin and Eye Clinics. Operations.

THURSDAY.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, Throat, and Ear Clinics. Operations.

FRIDAY.—10.30 A.M.: Ear, Nose, and Throat Clinics. 2.30 to 5 P.M., Medical, Surgical, and Children's Diseases Clinics. Operations.

Appointments.

GUY, J., M.B., C.M. Glasg., D.P.H., has been appointed Medical Officer of Health for Edinburgh.

TATTERSALL, S. R., L.R.C.P. Lond., M.R.C.S., Deputy Superintendent of Prestwich Mental Hospital.

Vacancies.

For further information refer to the advertisement columns.

Barnsley, Beckett Hospital and Dispensary.—H.P. £200.
Bath, Royal United Hospital. H.P. £120.
Bethnal Green Hospital, Cambridge-road, E.—Asst. M.O. £400.
Birkenhead County Borough.—Asst. M.O.H. and Bacteriologist. £750.
Birmingham, City of.—1st Asst. M.O. £600.
Birmingham General Hospital.—Res. H.S. to Throat and Ear Dept. £70. Also Anæsthetist. £120.
Birmingham, Midland Hospital, Easy-row.—H.S. £150.
Bolingbroke Hospital, Wandsworth Common, S.W.—H.P. At rate of £120.
Bristol Eye Hospital.—Temp. Asst. Hon. Surgeon. Also Registrar.
Bristol General Hospital.—H.P.'s, H.S.'s, Res. Obstet. O., also Cas. H.S. At rate of £60 and £80 respectively.
Bristol Royal Infirmary.—Hon. Reg. to Ear, Nose and Throat Dept. Also Hon. Asst. Radiologist.
Central London Ophthalmic Hospital, Judd-street, St. Pancras, W.C.—Sen. and Jun. H.S. £120 and £100 respectively. Out-Patient O. £200.
Chesterfield and North Derbyshire Royal Hospital.—Cas. O. At rate of £200. Also H.S.'s. At rate of £100 to £175.
Colchester, Royal Eastern Counties' Institution for Mentally Defective.—Clin. Research Worker. £600.
Colindale Hospital, Hendon, N.W.—Sen. Asst. M.O. £650.
Countess of Dufferin's Fund, Women's Medical Service for India.—Two Medical Women. 550 and 750 rupees per mensem.
Coventry and Warwickshire Hospital.—Res. Asst. H.S. £125.
Derby, Derbyshire Royal Infirmary.—Asst. H.S. and Cas. O. £150.
Dudley, Guest Hospital.—Hon. Gynæcologist and 2 Anæsthetists. Also Asst. H.S. £150.
Dumfries and Galloway Joint Sanatorium.—Res. Med. Supt. £700.
East London Hospital for Children, Shadwell, E.—Dermatologist.
Edinburgh Royal Infirmary.—Med. Reg. for Statistical Research. £250.
Egyptian University Faculty of Medicine.—Prof. of Hygiene. £E.1500.
Evelina Hospital for Children, Southwark, S.E.—H.S. At rate of £120.
Gloucester, Gloucestershire Royal Infirmary.—2nd H.S. At rate of £100.
Guy's Hospital Medical School, S.E.—Gull Studentship. £250.
Hampstead General and N.W. London Hospital, Haverstock Hill, N.W.—Cas. Surg. O. At rate of £100.
Hospital for Sick Children, Great Ormond-street, W.C.—Part-time Jun. Cas. O. At rate of £150.
Hull Royal Infirmary.—H.S. At rate of £150. 3rd H.S. At rate of £150.
Huntingdon County Hospital.—H.S. £125.
Ilford Borough.—Asst. M.O.H. £600.
Indian Medical Service.—Commissions.
Ipswich, East Suffolk and Ipswich Hospital.—H.P. £120.
Lambeth Hospital, Brook-street, Renfrew-road, S.E.—Jun. Asst. M.O. £200.
Leamington Spa, Warneford General Hospital.—Res. H.S. £165.
Leicester Royal Infirmary.—H.S. At rate of £125.
Lewisham Hospital, Lewisham, S.E.—Asst. M.O. £300.
Lincoln County Hospital.—Jun. H.S.
Liverpool, Mill-road Infirmary.—Res. Asst. M.O. £200.
Liverpool, Royal Children's Hospital, Myrtle-street,—Res. H.S. At rate of £60.
Liverpool, Royal Southern Hospital.—H.P., H.S. Also M.O. to Spec. Depts. Each at rate of £60.
L.C.C. Mental Hospital Service.—8th Asst. M.O. £445.
London University.—External Examinerships.
Manchester, Baguley Sanatorium.—Asst. M.O. £350.
Manchester, Booth Hall Hospital for Children, Charlestown-road, Blackley.—4th Asst. M.O. At rate of £250.
Manchester, Ear Hospital, Grosvenor-square, All Saints.—Non-Res. H.S. At rate of £150.
Manchester Northern Hospital for Women and Children, Park-place, Cheetham Hill-road.—Sen. H.S. and Jun. H.S. £130 and £100 respectively.
Miller General Hospital, Greenwich-road, S.E.—Cas. O. £150.
Nelson Hospital, Merton, S.W.—Res. M.O. At rate of £100.
Newark General Hospital.—Res. H.S. At rate of £150.
Newcastle-upon-Tyne, Education Committee.—Asst. School M.O. £500.
Newcastle-upon-Tyne General Hospital.—Surg. Director. Also Med. Director. Each £300.
New End Hospital, Hampstead, N.W.—Jun. Asst. M.O. £200.
Northampton General Hospital.—Asst. H.S. At rate of £150.
Oldham Royal Infirmary.—H.S. At rate of £175.
Plymouth, South Devon and East Cornwall Hospital.—H.S. At rate of £100.
Queen Charlotte's Maternity Hospital, Marylebone-road, N.W.—Res. M.O. £200.
Reading, Battle Infirmary.—Asst. Res. M.O. £300.
Reading, Royal Berkshire Hospital.—H.P. Cas O. and Res. Anæsthetist. Each at rate of £150.

Rotherham Hospital.—Sen. H.S. £200. Also H.P. £180.
Royal Free Hospital, Gray's Inn-road, W.C.—Res. Cas. O. £150.
Royal London Ophthalmic Hospital, City-road, E.C.—Sen. H.S. At rate of £150.
St. Bartholomew's Hospital, E.C.—Surgeon to Throat Dept. Also Asst. Physician.
St. Helens County Borough.—Asst. M.O.H. £600.
St. Mark's Hospital for Cancer, &c., City-road, E.C.—H.S. At rate of £75.
St. Marylebone Hospital, St. Charles-square, Ladbroke-grove, W.—Second Asst. M.O. £300.
Salford Royal Hospital.—Hon. Asst. S., also H.P. and H.S.'s. Each at rate of £125. Also Anæsthetist, 1 gn. per session.
Sheffield Children's Hospital.—3rd Res. M.O. £100.
Sheffield, Jessop Hospital for Women.—3 Asst. H.S.'s. Each at rate of £100.
Sheffield Royal Hospital.—Res. Anæsthetist. At rate of £80.
Sheffield Royal Infirmary.—H.P., H.S., Ophth. H.S., Asst. Aural and Ophth. H.S. Also Asst. Cas. O. All at rate of £80.
South-Eastern Hospital for Children, Sydenham, S.E.—Two Res. M.O.'s At rate of £100 and £75 respectively.
Southampton Free Eye Hospital.—H.S. £150.
South Shields, Ingham Infirmary.—Sen. and Jun. H.S.'s. £200 and £150 respectively.
Stafford, County Bacteriological Laboratory.—Locum Tenens Bacteriologist. 12 gns. weekly.
Stockport Infirmary.—Visiting Asst. Ophth. Surgeon for Eye Dept.
Sunderland, Durham County and Sunderland Eye Infirmary.—Locum.
Surrey County Council.—Asst. M.O. £600.
Swansea County Borough.—Asst. M.O. £600.
Truro, Royal Cornwall Infirmary.—H.S. £170.
Victoria Hospital for Children, Tite-street, Chelsea, S.W.—H.P. and H.S. Each at rate of £100.
Wallasey, Victoria Central Hospital.—Jun. H.S. At rate of £100.
Walsall General Hospital.—Cas. H.S. At rate of £120.
West African Medical Staff.—M.O.'s. Each £660.
West London Hospital, Hammersmith-road, W.—Two Clin. Assists. Res. Asst. Phys. £300.
Wigan Royal Infirmary.—Res. Med. and Surg. O. and Reg. £250. Also Two H.S.'s. Each at rate of £150.
Willesden General Hospital, N.W.—Res. H.S. £110.
Windsor, King Edward VII. Hospital.—H.S. At rate of £100.
York County Hospital.—Res. Anæsthetist. £150.

The Chief Inspector of Factories announces vacancies for Certifying Factory Surgeons at Cupar (Fifeshire), and Tonbridge (Kent).

Births, Marriages, and Deaths.

BIRTHS.

EAST.—On June 8th, in London, the wife of C. F. Terence East, M.D., F.R.C.P., of a daughter (stillborn).
HAWKINS.—On June 9th, the wife of B. E. Hawkins, M.R.C.S., of a son.
PEYTON.—On June 13th, at 19, Bentinck-street, W., the wife of Dr. Peyton, Harley-street, of a daughter.
RAMMELL.—On June 13th, at Bricket House, St. Albans, the wife of Dr. John Wootton Rammell, M.C., of a son.
REYNELL.—On June 10th, at 26, Nottingham-place, W., the wife of W. R. Reynell, M.D., of a son.

MARRIAGES.

ANDERSON—SINCLAIR-MACLAGAN.—On June 11th, at St. Mary's Episcopal Church, Kirriemuir, John Anderson, D.S.O., F.R.C.S., to Isobel Sinclair MacLagan, only daughter of Major-Gen. E. G. Sinclair-MacLagan.
BUCKTON—MEZ.—On June 11th, in Basel, Philip Rhoades Buckton, M.A., M.B., of Wymondham, Norfolk, to Annemarie Charlotte, only daughter of the late Professor Mez, of Basel University, and of Mrs. Mez.
DODD—OPENSHAW.—On June 14th, at St. Andrew's Church, Kensington, Harold Dodd, F.R.C.S., of Harley-street, to Kathleen Openshaw, of Madge Hill, Hanwell.
MACAFEE—LOWRY.—On June 4th, at Newtownbreda Presbyterian Church, Charles Horner Greer Macafee, M.B., F.R.C.S. (Eng. and I.), to Margaret Crymble, only daughter of Prof. C. G. Lowry, M.D., F.R.C.S., and Mrs. Lowry.
WATSON JONES—COOK.—On June 11th, at Princes-gate Baptist Church, Liverpool, Reginald Watson Jones, M.Ch., F.R.C.S., to Muriel, only daughter of Mr. and Mrs. C. W. Cook, of Mossley Hill, Liverpool.
WILLIAMS—COURON.—On June 12th, at the Oratory, Brompton, Dr. Leslie Williams, M.D., M.S., F.R.C.S., to Patrice, elder daughter of the late Mr. and Mrs. Hatton Ronayne Couron, of Mayfield, Sussex.

DEATHS.

DODD.—On June 11th, Col. John Richard Dodd, A.M.S., retired, of Killarney, Richmond Park-road, Bournemouth.
MINCHIN.—On June 5th, in London, Edward James, Minchin, L.R.C.S.I., L.R.C.P.I., in his 75th year.
SKIRVING.—On June 14th, at 6, Rothesay-place, Edinburgh, Archibald Adam Scot Skirving, C.M.G., F.R.C.S.E., aged 61.
WHITFORD.—On June 15th, at 26, Sandymount-drive, New Brighton, William Whitford, M.D., J.P., in his 86th year.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages and Deaths.

Notes, Comments, and Abstracts.

STERILISATION OF THE UNFIT.

A Report to the Lancashire Asylums Board

BY FRANK A. GILL, M.D. ABERD.,

MEDICAL SUPERINTENDENT OF THE CALDERSTONES CERTIFIED INSTITUTION FOR MENTAL DEFECTIVES, WHALLEY.

STERILISATION by castration has been known and practised as early as there are historical records. Unrestrained by public opinion which was, no doubt, dealt with by equally drastic means, our ancestors were actuated by a certain clarity of purpose which left no room for scruples or sentiment. For the creation of eunuchs, as a punishment for crime, and as a deterrent for prostitution, it was undoubtedly practised, but there is only legendary evidence that it was ever enforced for the improvement of the human race. Eugenic sterilisation, as it is called, is a modern practice which has met with a large measure of approval in California, and to a less extent in other American States, and elsewhere.

Historical.

Sterilisation for race improvement was first advocated towards the end of the eighteenth century, and again in the latter half of the nineteenth century public interest was aroused and discussions appeared in a few medical journals. The first actual operations, so far as I am aware, were performed without legal sanction in Kansas, U.S.A., towards the end of the last century. Legislation authorising it was first passed in Pennsylvania in 1905 and next in Indiana in 1907. A few other States in U.S.A. followed their example, but the practice fell into disuse from lack of public support, and at a later date it was declared unconstitutional and illegal. It was declared unconstitutional, as the law was made applicable to criminals and held to be a "cruel and unusual" form of punishment and, therefore, contrary to the Constitution.

More recently the sterilisation law in U.S.A. has been amended and declared constitutional, with the result that up to July 1st, 1929, the following 22 States have passed laws sanctioning its practice: Arizona, California, Connecticut, Delaware, Idaho, Iowa, Kansas, Maine, Michigan, Minnesota, Mississippi, Montana, Nebraska, New Hampshire, North Dakota, Oregon, South Dakota, Utah, Virginia, Washington, West Virginia, Wisconsin. In Canada, the Province of Alberta has legalised voluntary sterilisation of certain inmates of institutions, and British Columbia is investigating the question.

The Canton of Vaud, Switzerland, last year passed a law prescribing compulsory sterilisation for certain patients. In Germany discussion has been active, and the law seems to permit sterilisation of the unfit, when done with the consent of the patient, or near relative, or guardian. It has been recommended to the New Zealand Parliament, after consideration by an Official Committee.

The Operation.

The surgical operation in both sexes is eminently satisfactory, the danger to life is practically nil, and very few failures are recorded. In the male vasectomy is performed, a section of the cord is removed, and the cut ends tied. It can be done under a local anæsthetic and does not incapacitate the patient for work for more than one day. In the female the abdomen is opened under a general anæsthetic and a section cut from both Fallopian tubes. It involves 14 days in bed, but the danger to life is negligible. In over 2500 operations in the California State hospitals there have been only three deaths, one from anæsthetic and two from infection. Sterilisation by X ray and radium has been considered, but is of doubtful merit, both these agents being too uncertain in their action and not without risk. No doubt in course of time, as their properties are better known, they may become a valuable means of producing eugenic sterilisation without operation and without risk.

Californian Experience.

While many of the States of U.S.A. have laws permitting at the State's expense the sterilisation of mental defectives and insane patients, the Californian law makes it compulsory before discharge from certain institutions. Up till Jan. 1st, 1929, 6255 operations for sterilisation have been performed in this State, the operations being vasectomy or salpingectomy, no glands or organs are removed, and no adverse effects as a sequence are recorded. Sexual life and

activity in the majority of cases does not appear to be appreciably altered, and there is a very satisfactory absence of subsequent moral deterioration which could be attributed to the operation. Male ex-patients do not seem to regret the operation, while the women express definite satisfaction at the knowledge of their freedom from possible pregnancy.

Although the law itself is compulsory it is not often that it has to be invoked, patients and their relatives consenting to the operation freely prior to release. The willing consent of the patient and friends seems to be a striking feature of the public attitude towards it in this State. Should consent be withheld, the authorities have power to detain the patient in the institution if they think fit. The relatives can then only obtain his release by resort to court, which is sometimes successful under onerous conditions. An interesting feature is that voluntary sterilisation by normal married men and women is also being resorted to for the prevention of child-bearing for medical or social reasons.

Californian law now provides for the sterilisation of male offenders guilty of sexual offences: 1. Two convictions for rape, seduction, or at least three other crimes, if there is evidence that he is a moral or sexual degenerate or pervert. 2. A person who exhibits evidence of moral and sexual depravity. 3. A person guilty of carnal abuse of a female person under 10 years of age. For these crimes sterilisation under certain conditions is authorised. It has not been much used, and no deductions can be drawn as to its advisability; it is an entirely different thing from eugenic sterilisation. The appropriate punishment for these offences would appear to be castration, which would have some physical as well as moral therapeutic value.

General Policy.

The policy of eugenic sterilisation is to prevent the propagation of the unfit, the weak, the degenerate, presumably whether physical or mental. Nature in her own scheme made ample provision to secure the elimination of the unfit by natural laws, but these modern civilisation has effectively nullified without enforcing an efficient substitute. Science has provided a substitute simple, safe, and efficient, but it is its application which presents so many difficulties to-day. For the sake of brevity I must omit all reference to the religious, political, and economic sides of this question.

The first obvious question to decide is to which classes of a community is it applicable? Are the physically unfit and propagators or carriers of hereditary disease to be sterilised as well as their mentally unfit contemporaries; if not, why not? It will simplify my task if I leave others to answer the question and confine my observations to the mentally unfit only.

Claim to Reduce Number of Mentally Unfit.

The primary and chief claim for sterilisation is that it will, in time, materially reduce the numbers of the insane and mental defectives, and so ultimately relieve the community of the burden of their maintenance. The fallacy of this claim of wholesale sterilisation lies in the fact, and it is a fact, that the great majority of certifiable defectives are not the progeny of mentally defective parents, but of apparently normal or subnormal, yet more or less self-supporting citizens. In one Lancashire institution there are over 2500 inmates to-day. Very few of the parents are certifiable defectives, the great majority are decent self-supporting members of the community, whom no sterilisation laws could touch or seek to touch.

The great fundamental fact must be kept in mind that the great majority of insane or mental defective patients are not the off-spring of similarly afflicted parents. Yet 80 per cent. of mental deficiency and a smaller percentage of insanity is hereditary. How then does it arise? The answer is that the majority of victims of mental infirmity come of families who are the subject of some mental instability; whose germ cells are in some way faulty, and who may only be carriers or transmitters of defect without themselves exhibiting any trace. It may be so slight and circumstances so favourable that infirmity is never suspected and the progeny escape. On the other hand, a stronger taint and, or, more unfavourable circumstances may intensify the latent defect and so develop the disease.

To express it another way, if every certifiable mental defective had been sterilised 20 or 30 years ago it would have made little appreciable difference to the number of defectives existing to-day. This does not deny the fact that mental deficiency is inherited, nor that the progeny of mental defectives would themselves almost certainly be subnormal, but it does show that mental deficiency cannot be exterminated by sterilising existing defectives. One would have to sterilise all members of the community who are the victims of a mentally unstable constitution, who are probable carriers of mental defect which they will transmit to their progeny, given the necessary combination of circumstances.

Sterilisation of Selected Cases.

While the arguments against a policy of wholesale sterilisation are undeniably strong, there seems to be an excellent case for sterilisation of selected cases. In Calderstones at the moment there are the following certified women who have given birth to illegitimate children:—

Total number of female patients resident at Calderstones on Jan. 1st, 1930, who were 16 years of age or over at the date of their admission (of child-bearing age)					572
Number who have had illegitimate pregnancies					132
Total pregnancies (of which eight were miscarriages or stillbirths)					253
Total of children born alive					245
Number of patients with 1 pregnancy			63 =	63	pregnancies.
,, ,, ,, 2	pregnancies		40 =	80	,,
,, ,, ,, 3	,,		21 =	63	,,
,, ,, ,, 4	,,		2 =	8	,,
,, ,, ,, 5	,,		4 =	20	,,
,, ,, ,, 9	,,		1 =	9	,,
,, ,, ,, 10	,,		1 =	10	,,
Total ..			132 =	253	,,
Percentage having illegitimate pregnancies = 23·8					

Obviously there is something radically wrong with the legislature of a State which permits certifiably defective women to become pregnant nine and ten times, and give birth to a like number of illegitimate and almost certainly defective children. The same applies to the other cases quoted above in a slightly less degree. Amongst female patients released from Calderstones for a short holiday on trial, in situations, four have been brought back pregnant within the last six months. The lesson here would seem to be that female patients of child-bearing age must never be released even on trial, but it is hard on the parents and hardly fair, as well as discouraging to the patients never to give them a holiday home or a trial to make good. The obvious remedy here is sterilisation before leaving an institution, a policy already in force in California. To a less extent the same precautionary measure seems reasonable to apply to adult male patients before release on trial. There are many patients of both sexes whose infirmity is so pronounced that they are only fitted to spend their lives in an institution, where it is probably as economical to keep them as at liberty; but there are undoubtedly many others who might lead at least partially self-supporting and useful lives in suitable employment or in care of their friends but for the danger of propagation of their kind. For these latter the obvious remedy seems to be sterilisation under proper safeguards.

Insanity and Epilepsy.

The hereditary nature of the liability to some forms of insanity is admitted, though that of epilepsy may be more debatable. The case for sterilisation seems specially strong in those types of insanity which exhibit periodical remissions during which the patient is well enough to be discharged to the care of his friends, and, if married, unfortunately, to the care of wife or husband. They return to married life with every prospect of additional children being born to perpetuate the disease. It seems to be particularly desirable that this class of patient should be sterilised, and especially in the case of the wife, since the strain and anxiety of child-bearing is often no mean factor in precipitating a relapse. In mental hospitals it is now the practice to grant parole as freely as possible; it would seem a reasonable procedure to sterilise selected cases before doing so.

Objections to Sterilisation.

The first objection raised is the danger of an increase in sexual promiscuity with its trail of venereal disease. This argument is freely used by opponents of the policy. The answer is that these arguments are pure surmise and contrary to the experience of social workers in California. In that State, to which we are indebted for its bold experiment, a well-devised scheme of subsequent supervision by experienced social workers is an essential part of the policy.

The reports by interested observers who have visited and investigated on the spot is that the danger is groundless, and that there is no increase in sex delinquency as a sequence to sterilisation. They point out with great truth that the mental defective is usually a sex delinquent by nature, with strong desires unrestrained by moral control or fear of consequences, and the fact that after sterilisation he or she is released from consequential results of immorality makes little difference in conduct. This answer seems reasonable, and my own experience indicates that the majority of higher grade female defectives are immoral before they are committed to Calderstones. They are oversexed with little control and no forethought of the consequences. I do not believe that the act of sterilising will make them any more lax in their morals by depriving them of a "fear of consequences" which never existed. The fact remains that the

reports from California indicate no increase of immorality, though they do not claim any improvement as a sequence. It is interesting to note that in the Californian experiment 125 feeble-minded sterilised women were married with the consent of the authorities, and the marriage has been considered successful in two-thirds of the cases. A second argument by opponents of sterilisation is the probability that public opinion may seize on sterilisation as a cheap and economic remedy for dealing with the problem of the unfit and so cease to make adequate provision in the way of institutions and hospitals. If the problem of the unfit is properly understood this seems to me a futile argument.

Conclusions.

My own view is that: (1) Sterilisation of either sex is a safe and efficient operation. (2) A policy of wholesale sterilisation of the mentally unfit is neither necessary nor desirable. (3) Sterilisation of selected cases of both sexes is desirable before release from mental defective institutions. (4) Certifiable women who become pregnant or are immoral should be sterilised forthwith. (5) Sterilisation of the recurrent insane is desirable and justifiable both in the interests of the race and as a therapeutical measure which relieves them of the anxiety of child-bearing and maintaining a family.

THE SUPPLY OF PASTEURISED MILK.

TWENTY years ago the passage of milk from the cow to the consumer was a comparatively calm one. A conscientious dairyman might occasionally take a sample to a vacant corner of his premises, estimate the fat content by the depth of the cream line, the cleanliness by the colour, and the quality by taste, but even so short a time ago as this there was almost no scientific investigation. To-day the passage is stormy. The milk sold by United Dairies, Ltd., is tested chemically and bacteriologically at the rural centre, at the urban distributing centre, and at any time of the day or night and in any part of its journey by a "flying squad." It is collected and transmitted with close attention to cleanliness and temperature, and is distributed in special bottles, which are soaked and washed for 40 minutes, and then rinsed with Czaplewski's fuchsin to make sure that no film of dirt remains.

At the opening of the company's new research laboratories by Sir Andrew Balfour, on June 16th, the guests were shown the whole process of milk collection and distribution at the large central depôt in Willesden. No less than 50,000 gallons, or 1200 tons, are handled here daily, and over 500 samples are examined in 21 laboratories in London every day. From the small lorries which collect it from the farms the milk is transferred to glass-lined tanks, where it is kept at a temperature below 40° F. throughout the rest of its journey. It is pasteurised at the London depôt at a temperature of 145° F., and then bottled. Over 8,000,000 bottles are distributed every week, and the organisation employs a staff of 12,000 men and women.

In the laboratories the milk is tested for contamination and the fat percentage by chemical methods, and for its general bacterial content by the reductase test with methylene blue. A recent introduction is the microscopic lantern, through which milk samples magnified 225,000 times are projected on to a screen and bacteria are thus revealed. In practice it is found that the result of a test depends on the level from which the sample is taken in the churn. As an example may be cited one specimen of milk which revealed 460,000 organisms per cubic centimetre and the presence of *Bacillus coli* in one-hundredth when the sample was taken from the top of the churn with a dipper. When the same milk was properly mixed in the churn, the bacterial count was reduced to 40,000, and no *B. coli* were found. The suggestion is made that chemical tests should be done at the same time as bacteriological, for if a fat percentage of over six, for instance, is discovered, it will be obvious that the sample is not a representative one.

All the United Dairies' milk is pasteurised. Their authorities hold that the tuberculin test for cattle is not sufficiently reliable, either in a negative or a positive sense, and that pasteurisation is the only way to avoid the risk of the tubercle bacillus in the milk. Moreover, partial sterilisation covers also the risk of infection from an unhealthy dairyman. In support of their policy they say that if vitamin C is destroyed, it is very easily added in a teaspoonful of fruit juice, and there is considerable evidence to show that the milk of stall-fed cattle does not contain this vitamin in any case. Pasteurisation, it is stated, causes no radical chemical change, and the small amount of calcium that is rendered non-dialysable is unlikely to make any great difference to the human child, considering that the cow's milk is intended for an animal with much larger and heavier bones.

An interesting piece of research has recently been carried out on thermophilic organisms in milk. These were first discovered as a result of a breakdown in the plant. If the machinery stands still for a time at pasteurisation temperature these organisms multiply and form acid. They are non-pathogenic; some are spore-formers and protein-splitters, others are vegetating, non-sporulating lactobacilli, which produce large quantities of lactic acid. The important practical point about them is that the Ministry of Health tests are all based on a temperature of 98° F., and the difference of a degree or so in the temperature might permit the multiplication of the thermophile group. The result would be a high bacterial count, and a quite false suggestion that the milk was unhygienically collected. The organisms are present in all raw milk, but they are depressed or attenuated by refrigeration. To destroy them the milk should be kept at 33° F. for 44 hours. Hence the lowered temperature in the glass travelling-tanks, and hence also the practice of shutting down and sterilising the pasteurisation plant every five hours.

In declaring the new laboratories open Sir Andrew Balfour said that the United Dairies had helped the rural medical officer by clean milk competitions in young farmers' clubs, and had done a public service by transferring a large part of the milk supply of the metropolis from the open can to the sterile bottle.

ACCEPTABLE ADVERTISING.

THE wealth of faultily addressed and unattractive material which reaches the average practitioner is not merely irritating but absurdly wasteful, since as often as not it is discarded without examination. The Addressing Company, of 8, Stone Buildings, Lincoln's Inn, London, W.C. 2, has made an attempt to remedy the present casual methods of commercial firms, and undertakes to circularise the medical profession as a whole, or specified groups of members in a manner which shall be accurate and acceptable. The chief points for which the company claims credit are absolute propriety of address, with accurate qualifications and postal direction, and the distribution of ethical material only, following the standard set by the medical journals. The service includes, in addition to the British Isles, the greater part of the Empire. A daily corrections service undertakes to supply to those firms who undertake their own addressing information of changes of address, new degrees and qualifications, and changes of name by marriage. The service can obviously perform a useful function in the prevention of waste by the manufacturer and annoyance to the recipient.

BLOOD GROUPS AND THE SCHICK REACTION.

THE relation of the various blood groups to the Schick diphtheria reaction has been studied by Dr. J. E. Sola,[1] who reports the results of observations on 17 families with 45 children. The conclusions at which he arrives are briefly: that blood grouping is transmitted hereditarily on Mendelian lines, and that the Schick reaction may be found indifferently in any group. If both parents give a positive reaction all the children do the same, supposing their blood groups are the same, and this is also true of a negative reaction; but if the group varies, or there is recessivity amongst the children, the correspondence breaks down. Susceptibility to diphtheria as regards parents and children depends on their both belonging to the same blood group, hence, in Sola's opinion, it is probably due to an hereditary constitutional factor and not to transmitted acquired immunity. The results of the Schick reaction on parents and offspring were held to show that susceptibility to diphtheria is transmitted on Mendelian lines. The conclusions are interesting, but Sola admits that the numbers investigated are small, partly because of the difficulty of getting whole families to consent.

A PANEL OF TRANSLATORS.

THOSE who require the services of a translator often have difficulty in finding one who has both a knowledge of the language and also of the special subject concerned, and the difficulty increases where the language is uncommon and the subject highly technical. In order to meet this need the Association of Special Libraries and Information Bureaux (26, Bedford-square, London, W.C.) has prepared a scheme for establishing a panel of translators having both linguistic and technical qualifications, the part taken by the association being to act as a connecting link between the translator and the user. Names of approved qualified persons are now being registered, and those who are interested, in either capacity, are invited to write for particulars to the secretary of the association.

[1] Semana Méd., April 24th.